

Crowle Lindum Grove FA

Ground Investigation Report

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Appendix A Ground Investigation Factual Report

1. Introduction

1.1 Purpose of this report

Gutteridge Haskins and Davey Ltd (GHD) was commissioned by Severn Trent Water Limited (STW) to produce an interpretative Ground Investigation Report for three active wastewater sites at Lindum Grove, Crowle, Scunthorpe, DN17 4EH. The three areas are Windsor, Ealand and Axholme.

STW propose the design of two pumping stations, one rising main and upsizing of gravity sewers. At the time of writing, a provisional development has been formulated. However, it is considered likely that this layout will change in due course due to development constraints and design requirements.

A Phase I geo-environmental desk study was provided for the wider area including Windsor and Ealand. The Axholme site was not covered with the desk study.

1.2 Scope and limitations

This interpretative report comprises the following scope of works:

- Review all available provided information that may be relevant to the scheme including history, geology, mining, hydrogeology, historical borehole records and existing ground investigation data;
- Provide factual information relating to the site works, including the intrusive investigation and associated laboratory analysis; and
- Provide an interpretation of the geotechnical and groundwater conditions to inform the future design of the scheme.

This report fulfils the requirements of the Ground Investigation Report (GIR) as outlined in BS EN 1997-1:2004+A1:2013.

An interpretation and discussion on any potential contaminated land is outside of the scope of this report.

This report: has been prepared by GHD for Severn Trent Water Limited and may only be used and relied on by Severn Trent Water Limited for the purpose agreed between GHD and Severn Trent Water Limited as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than Severn Trent Water Limited arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

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The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

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Accessibility of documents

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

1.3 Geotechnical Category

The scheme is provisionally classified as a Geotechnical Category 2. BS EN 1997-1 (Eurocode 7) defines a Geotechnical Category 2 as conventional types of structure and foundation with no exceptional risk or difficult or loading conditions.

The category should be checked and changed, if necessary, at each stage of the design and construction process.

2. Existing Information

2.1 Site Location and Description

There are three separate areas of interest at the site, Windsor (Commonside), Ealand and Axholme. Windsor and Axholme are both located within village of Crowle, Lincolnshire, with Ealand located off Main Street, south east of Crowle. Crowle is located approximately 11km west of Scunthorpe.

2.1.1 Windsor

The Windsor site is an existing sewage treatment works on Marsh Road extending along Windsor Road. There is an existing rising main route extending from a pumping station off Windsor Crescent, north of Windsor Road, through farmland to the west of the town, north west towards Crowle treatment works on Marsh Road.

2.1.2 Axholme

Axholme comprises an existing rising main located within Wharf Road. The length of Wharf Road is approximately 275m.

2.1.3 Ealand

Ealand is an existing sewerage pumping station. The site is roughly rectangular and is approximately 25m by 50m. The sit comprises a circular tank with associated manholes and an access road.

2.2 Site History

A summary history of the site has been obtained from the National Library of Scotland's historical maps and the relevant historical maps from the Phase 1 desk study. The National Library of Scotland has a digital map archive which covers the UK, including the site.

Three sites have been identified as a sewerage works or associated pumping stations from the mid 1900s. The area surrounding the sites were subject to residential development associated with the villages of Crowle and Ealand.

2.3 Geology

2.3.1 Windsor

Superficial deposits

The published British Geological Survey (BGS) mapping indicates the Windsor site to be underlain by alluvium and the Sutton Sand Formation. Peat deposits are shown to be present approximately 250m to the southwest.

The Sutton Sand Formation is described by the BGS as 'fine-grained, silty sand'. The alluvium is described as 'clay, silt, sand and gravel. The clay is usually soft to firm, consolidated, compressible and silty, but can contain layers of silt, sand, gravel and peat'.

Bedrock

BGS records indicate that the bedrock geology comprises the Mercia Mudstone Group. The Mercia Mudstone is described as 'dominantly red, less commonly green-grey, mudstones and subordinate siltstones with thick halitebearing units in some basinal areas. Thin beds of gypsum/anhydrite are widespread; thin sandstones are also present'.

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2.3.2 Axholme

Superficial deposits

The published British Geological Survey (BGS) mapping indicates the Axholme site to be underlain by the Sutton Sand Formation.

Bedrock

BGS records indicate that the bedrock geology comprises the Mercia Mudstone Group.

2.3.3 Ealand

Superficial deposits

The published British Geological Survey (BGS) mapping indicates the Ealand site to be underlain by the Sutton Sand Formation.

Bedrock

BGS records indicate that the bedrock geology comprises the Mercia Mudstone Group.

2.4 Mining

Both the Windsor and Axhlme sites lie within the Coal Authority (CA) Coal Mine Reporting Area. Although, there are no known past or current mine working or entries within the vicinity of the site.

The BGS GeoIndex indicates that there are no active mines or quarries within 500m of the three sites.

2.5 Hydrology and Hydrogeology

The Environment Agency (EA) classifies the Sutton Sand Formation and the alluvium as Secondary A Aquifers. These are define as 'permeable layers capable of supporting water supplies at a local rather than strategic scale and in some cases forming an important source of base flow to rivers, these are general aquifers formerly classified as minor aquifers'.

The Mercia Mudstone is classified as a Secondary B aquifer. Secondary B aquifers are defined as 'predominantly lower permeability layers which may store/yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering'.

2.6 Unexploded Ordnance (UXO)

The Zetica online unexploded bomb risk maps identify the three sites as within a low-risk area, indicating that the area has 15 bombs or less per 1000 acres.

2.7 Previous Investigations

2.7.1 Windsor

A previous ground investigation was designed and supervised by COWI in August 2021. A draft interpretative ground investigation report was provided (A131380-026 R-001, August 2021), although the factual ground investigation report appendix was not provided.

There were no relevant BGS boreholes within 300m of the site.

The ground investigation was divided into two separate ground investigations, at Windsor Crescent and the existing sewerage treatment works. The investigation comprised a combination of cable percussive boreholes or window sampling followed by rotary coring and mechanically excavated trial pits. The ground investigation identified a downward succession of Made Ground, alluvium over Mercia Mudstone. The alluvial material generally comprised clay, silt and sand, including considerable pockets of peat.

Without the factual report, the position and elevation of the positions was not able to be verified. The field and laboratory data was not available to be interrogated and scrutinised.

Where appropriate, the ground investigation data from the 2021 investigation will be incorporated into the dataset within Section 5 of this report.

2.7.2 Axholme

There were no previous ground investigation reports provided or relevant BGS boreholes within 300m of the site.

2.7.3 Ealand

There were no previous ground investigation reports provided or relevant BGS boreholes within 300m of the site.

3. Field and laboratory studies

3.1 Overview

An intrusive ground investigation was designed by GHD and undertaken by Soctec Limited. The fieldwork was carried out in two phases between 26 September and 26 October 2022 and between 7 and 8 December 2022. The investigation comprised:

Windsor / Commonside

- One cable percussion borehole extended by rotary core (BH01-W) to a depth of 24m below existing ground level.
- Three dynamic sampler boreholes (WS01-W, WS02-W and WS09-C) to a maximum depth of 6m below existing ground level..

Axholme

 Four window sampler boreholes (WS05-A to WS08-A) to a maximum depth of 5m below existing ground level...

Ealand

- One cable percussion borehole extended by rotary core (BH02-E) to a depth of 20m below existing ground level.
- Two window sampler boreholes (WS03-E and WS04-E) to a maximum depth of 5m below existing ground level..

The as-drilled positions were surveyed by SOCOTEC to National Grid and Ordnance Datum using a GPS, and the locations are shown within the factual ground investigation report, presented as Appendix A.

3.2 Groundwater monitoring

Boreholes were installed with groundwater monitoring standpipes. Three visits to site have been completed for the recording of groundwater and ground gas readings within the installed standpipes. These visits were on 21/11/2022, 08/12/2022 and 19/12/2022.

3.3 In-situ testing

Standard penetration tests (SPT) were carried out within the boreholes.

The results of the SPTs undertaken within the investigation in addition to the SPT hammer energy ratio certificate are provided within the factual ground investigation report, presented as Appendix A.

3.4 Laboratory testing

Geotechnical laboratory testing of selected samples was scheduled by GHD and undertaken by Socotec's approved laboratory. A summary of the geotechnical testing undertaken is provided below:

- Classification
- Strength
- Compaction
- Consolidation
- Geochemical
- Rock

The results are interpreted within Section 5 below and are provided within the factual ground investigation report, presented as Appendix A.

4. Ground model

4.1 Windsor

4.1.1 Ground conditions

This section presents a summary of ground conditions encountered at the site for the Windsor and Commonside during the 2022 GHD ground investigation. Boreholes related to this site are: BH01-W, WS01-W, WS02-W and WS09-C.

Table 1 Summary of ground conditions (Windsor)

Stratum	General description	Top of strata (m) [mOD]	Thickness (m)
Topsoil	Brown slightly silty fine and medium SAND.	Ground level [1.90m]	0.50
Made Ground	Dark brown sandy gravelly clayey SILT. Gravel is subangular to subrounded fine and medium of mudstone, brick and quartz. Wood fragments and potential buried topsoil identified within WS02-W. [Deeper mixed cohesive and granular horizons identified within WS02-W]	Ground level [+1.58 to +2.16]	1.00 to 3.70
Sutton Sand Formation	Medium dense light brown gravelly very silty fine to coarse SAND with rare cobbles. Locally very clayey.	0.5 to 1.0 [+0.58 to +1.40]	2.00 to 2.60
Mercia Mudstone – Reworked (V) and Destructured (IVb) (1)	Firm to stiff reddish brown slightly sandy slightly gravelly silty CLAY. Gravel is subangular fine of siltstone. Horizon (<600mm) of SAND and GRAVEL within WS02-W and WS09-C.	1.5 to 3.7 [+0.66 to -1.67]	3.00 to 6.81
Mercia Mudstone – Partially Weathered (II) (2)	Extremely weak to very weak, locally weak, thinly laminated reddish brown locally calcareous MUDSTONE. Very weak to weak grey, becoming reddish brown, thinly laminated SILTSTONE with occasional widely spaced beds of gypsum (up to 110mm).	9.91 [-8.01]	Not Proven

Note:

- (1) Reworked (grade V) and destructured (IVb) mudstone have been combined due to the field descriptions and likely behaviour as a soil rather than a rock due to the extent of weathering.
- (2) Partially weathered (grade II) depths are based on results from cable percussion holes

4.1.2 Groundwater

Groundwater was encountered within all boreholes. The groundwater was encountered within the Made Ground at 2.0m below ground level (+0.03mOD), Sutton Sand Formation at 1.58m below ground level (0.0mOD) and reworked (grade V) and destructured (IVb) mudstone between 2.30 and 7.60m below ground level (-0.14 and -5.7mOD).

4.2 Axholme

4.2.1 Ground conditions

This section presents a summary of ground conditions encountered at the Axholme site during the 2022 ground investigation. Boreholes related to this site are: WS05-A, WS06-A, WS07-A and WS08-A.

Table 2 Summary of ground conditions (Axholme)

Stratum	atum General description		Thickness (m)
Made Ground	Dark brown silty fine and medium SAND with roots. Dark brown and black gravelly clayey fine to medium SAND. Gravel is angular to subrounded fine to coarse of sandstone and mudstone.	Ground level [+3.22 to +4.60]	0.40 to 1.85
Sutton Sand Formation	Very loose to medium dense dark orange mottled black slightly clayey fine and medium SAND. WS05-A and WS06-A identified an interbedded horizon (<0.3m) of peat at 2.30m and 2.75 (+0.92 and +0.56mOD). This was described as plastic dark brown and black locally spongy pseudo-fibrous PEAT with a very strong organic odour and spongy dark brown fibrous PEAT with a very strong organic odour.	0.4 to 0.5 [+2.80 to +3.28]	1.55 to 2.90
Mercia Mudstone – Reworked (V) and Destructured (IVb)	Firm to stiff, locally soft, dark brownish grey silty CLAY. Thin (<0.2m) bands of Partially Weathered (II) mudstone were recorded within this stratum. Thin (<0.15) horizon of brown clayey fine and medium SAND identified within WS07-A and WS08-A.	1.85 to 3.3 [-0.08 to +2.75]	0.75 to Not Proven
Mercia Mudstone – Partially Weathered (II)	Weak grey mudstone interbedded with stiff dark red CLAY.	3.80 [-0.5]	Not Proven

Note: Reworked (grade V) and destructured (IVb) mudstone have been combined due to the field descriptions and likely behaviour as a soil rather than a rock due to the extent of weathering. Due to the drilling technique selected (dynamic sampler) limited penetration was possible into the Partially Weathered (II) mudstone.

4.2.2 Groundwater

Groundwater was encountered within all boreholes except one (WS08-A). The groundwater was encountered within the Sutton Sand Formation at 2.87m below ground level (0.35mOD) and the interbedded peat within the Sutton Sand Formation at 2.87m below ground level (0.35mOD) and reworked (grade V) and destructured (IVb) mudstone at 2.84m below ground level (+0.84mOD).

4.3 Ealand

4.3.1 Ground conditions

This section presents a summary of ground conditions encountered at the Ealand site during the 2022 ground investigation. Boreholes related to this site are: BH02-E, WS03-E and WS04-A.

Table 3 Summary of ground conditions (Ealand)

Stratum	General description	Top of strata (m) [mOD]	Thickness (m)
Made Ground	Soft light brown slightly sandy gravelly SILT. Gravel is subangular to subrounded fine to coarse of sandstone, siltstone, limestone and brick. Loose to medium dense dark brown slightly gravelly clayey fine and medium SAND. Gravel is angular to subangular fine to coarse of sandstone and siltstone.	Ground level [+2.88 to +4.96]	0.70 to 1.70
Sutton Sand Formation	Loose to medium dense yellowish brown slightly gravelly fine SAND. Gravel is angular to subangular fine and medium of sandstone and siltstone.	0.7 to 2.60 [+2.18 to +2.36]	2.10
Mercia Mudstone – Reworked (V) and Destructured (IVb) (1)	Firm to very stiff orangish brown slightly sandy silty CLAY.	1.00 to 2.80 [+0.08 to +3.32]	0.95 to 2.05
Mercia Mudstone – Partially Weathered (II) (2)	Thinly interlaminated to very thinly interbedded MUDSTONE and SILTSTONE. Mudstone is extremely weak to very weak thinly laminated to very thinly bedded, greenish grey. Siltstone is weak thickly laminated to very thinly bedded light greenish grey.	4.85 [-1.97]	Not Proven

Note:

- (3) Reworked (grade V) and destructured (IVb) mudstone have been combined due to the field descriptions and likely behaviour as a soil rather than a rock due to the extent of weathering.
- (4) Partially weathered (grade II) depths are based on results from cable percussion holes

4.3.2 Groundwater

Groundwater was encountered within two boreholes and absent from one (WS03-E). The groundwater was encountered within the Sutton Sand Formation at 2.60m below ground level (+2.36mOD) and reworked (grade V) and destructured (IVb) mudstone at 4.0m below ground level (-1.12mOD).

5. Material Properties

5.1 Introduction

An assessment has been made of the ground conditions across the three different project areas of the site. Given consistency of the published geology, the availability of the dataset and the similarities between the three areas for the Mercia Mudstone, the material properties will be defined as per the entire project site rather than individual areas for this stratum. There is more variability in the Sutton Sand Formation across the site, therefore parameters for this stratum are separated by site.

A discussion on the material properties is provided per strata in the relevant sections below.

5.2 Standard Penetration Test (SPT)

SPTs were undertaken during drilling works in both cable percussion and dynamic sampler boreholes. A summary of the SPT range, as well as the corrected N60 value to account for SPT hammer efficiency, is provided in Table 4.

Table 4: Summary of corrected SPT values (All Strata)

Strata	Number of tests undertaken	Minimum	Maximum (maximum extrapolated)	Average
Made Ground	7	0	23	10
Sutton Sand Formation	13	1	29	12
Reworked Mudstone	12	1	23	12
Destructured Mudstone	14	2	50 (200)	68
Partially weathered Mudstone	6	20	50 (3000)	768

Note: The average values of the destructured and partially weathered mudstone are extrapolated from the measured blow counts, the maximum extrapolated values are presented in the table above in brackets. Two cross strata boundary tests were omitted from the above for ease of reference.

A summary of the corrected N60 value versus elevation of each strata type are shown in Figure 1. Note, the SPT N60 values 50 and above are not shown for ease of reference.

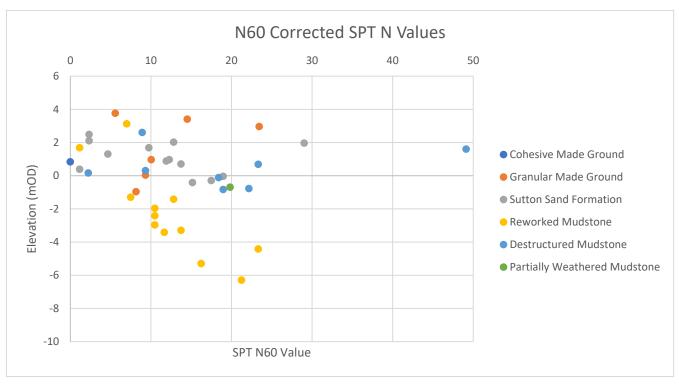


Figure 1: N60 Corrected SPT Values - All Strata

5.3 Made Ground

5.3.1 Overview

Made Ground was encountered at all three project locations. Based on the field descriptions, the Made Ground should be considered to be variable horizontally and laterally and in composition and strength.

The Made Ground was recorded as both interbedded cohesive and granular materials. Anthropogenic items were identified within the Made Ground including brick, wood and concrete. The inclusion of these materials indicate that the strata is non-engineered and unlikely to have been placed in a controlled manner.

Based on the proposed works and the understanding that Made Ground is principally to be removed.

5.3.2 Classification testing

One Atterberg Limits (plasticity) test was undertaken from select samples of Made Ground obtained from the intrusive investigation. This test recorded a moisture content of 26%, 100% passing the 0.425mm sieve and as non-plastic material.

5.3.3 Particle size distribution (PSD)

A summary of the particle size distribution testing of selected samples is presented in Table 5.

Table 5: Summary of Particle Size Distribution (Made Ground)

Strata	Clay %	Silt %	Sand %	Gravel %	Cobbles %
Cohesive Made Ground	3	8	20	42	0
Granular Made Ground	9 to	20	76.5 to 91	0.1 to 3.6	0

5.3.4 Moisture content / dry density relationship

Compaction testing was not undertaken for the Made Ground material.

5.3.5 Weight density

Weight density of the stratum was determined using published guidance (BS 8002:2015) based on a low to medium strength clay.

A characteristic weight density value of 18kN/m³ is recommended for this material. Most onerous value for design situation should be used in design.

5.3.6 Aggressivity testing

Selected soil samples of Made Ground were sent for aggressivity testing to aid concrete design. A summary of the test results is presented in Table 6.

Table 6: Aggressivity testing summary (Made Ground)

	Number of tests	Minimum	Maximum	Average
Cohesive Made Grour	nd			
Sulphate as SO₄ (mg/l)	5	52	759	257
рН	5	6.8	8.2	7.7
Granular Made Groun	d			
Sulphate as SO₄ (mg/l)	8	33	2700	408
рН	8	6.8	8.9	8.0

An assessment of the potential presence of pyrite within the Made Ground was undertaken in accordance with BRE SD1. This assessment identified oxidised sulphate results below the lowest threshold (<0.24%).

Although, not identified, pyrite can be aggressive to concrete and the designer should also take the potential effects of potential ground condition into account.

5.4 Sutton Sand Formation

5.4.1 Overview

The Sutton Sand Formation was identified in all three site locations with a relatively consistent thickness. The stratum was generally encountered within a medium dense relative density, although very loose and loose locally.

Organic material / peat bands were encountered at the Windsor and Axholme sites.

5.4.2 Classification testing

One Atterberg Limits (plasticity) test was undertaken from select samples of the Sutton Sand Formation obtained from the intrusive investigation. This test was undertaken on the peat horizon and recorded a moisture content of 239%, 100% passing the 0.425mm sieve and as non-plastic material.

5.4.3 Particle size distribution (PSD)

A summary of the particle size distribution testing of selected samples is presented in Table 8.

Table 7: Summary of Particle Size Distribution (Sutton Sand Formation)

Strata	Clay %	Silt %	Sand %	Gravel %	Cobbles %
Sutton Sand Formation	9 to	48	26 to 91	0 to 20	0 to 7.3

5.4.4 Moisture Content / Dry density relationship

Compaction testing was undertaken for the Sutton Sand Formation (using 2.5 kg rammer techniques) including moisture content on one sample, with the results summarised in Table 9.

Table 8: Moisture Content-MDD value summary (Sutton Sand Formation)

Stratum	MC (%)	OMC (%)	MDD (Mg/m³)
Sutton Sand Formation	26	14	1.74

5.4.5 Strength parameters

Using the SPT data and reference to CIRIA 143, along with PSD data, angularity descriptions and reference to BS 8002:2015, the estimated φ 'cv range has been calculated. Using methods from BS8002:2015, the range of φ 'cv is between 29 and 36, and the range of the CIRIA 143 φ 'cv is presented below in Table 9 for each of the sites. However, given the variable range of fine recorded within the deposit and the relative density of very loose and loose recorded, consideration to the lower values should be made in design.

Table 9 Constant volume friction angle summary CIRIA 143 (Sutton Sand Formation)

Site	Number	Min	Max	Average
Windsor	4	28	35	32
Ealand	5	32	37	34
Axholme	4	28	34	30

5.4.6 Stiffness

The drained Young's modulus, E', has been estimated using the SPT 'N' values recorded in the Sutton Sand Formation using the following relationship by Stroud (1989) taken from CIRIA Report 143 (1995): E'/N = 1.5 MPa

The drained stiffness, E', of this material varies between 2 and 44 MPa with an average of 18 MPa.

Table 10 Drained Young's modulus summary (Sutton Sand Formation)

Site	Min	Max	Average
Windsor	2	26	18
Ealand	15	44	25
Axholme	4	19	8

5.4.7 Aggressivity testing

Selected soil samples of the Sutton Sand Formation were sent for aggressivity testing to aid concrete design. A summary of the test results are presented in Table 10.

Table 11: Aggressivity testing summary (Sutton Sand Formation)

	Number of tests	Minimum	Maximum	Average		
Sutton Sand Formatio	n (Peat absent)					
Sulphate as SO₄ (mg/l)	5	27	582	164		
рН	5	8.1	8.8	8.42		
Sutton Sand Formatio	Sutton Sand Formation (Peat present)					
Sulphate as SO₄ (mg/l)	3	277	1180	741		
рН	3	5.6	7.0	6.48		

5.4.8 Weight density

Weight density of the stratum was determined using published guidance (BS 8002:2015) and the laboratory testing on soil samples from the compaction testing.

A characteristic weight density value of 18kN/m³ is recommended for this material. This should be locally adjusted to account for the presence of the organic material within design.

5.5 Mercia Mudstone - Reworked (V) and Destructured (IVb)

5.5.1 Overview

The Mercia Mudstone was identified within all exploratory locations. This bedrock has been subdivided into the weathering profile as originally established within CIRIA Report 47 Chandler and Davis (1973). The classifications have been subdivided for practicality and ease of reference into soils (Reworked (V) and Destructured (IVb)) and rock (Partially Weathered (II)).

The Reworked and Destructured mudstone was typically described as a firm to stiff cohesive material, although interbedded granular horizons were encountered at the Windsor and Axholme sites. Within the clay there are, in areas, harder bands where the mudstone is less weathered. With increasing depth the mudstone will grade into the more competent type III and type II classifications.

5.5.2 Classification testing

The results of the Atterberg Limits (plasticity) test undertaken with values for moisture content undertaken from select samples of the Mercia Mudstone obtained from the intrusive investigation are presented in Table 11 with laboratory certificates presented in Appendix A.

Table 12: Summary of classification testing (Reworked (V) and Destructured (IVb))

Strata	MC %	LL %	PL %	PI %
Mercia Mudstone - Reworked (V)	20 to 32	28 to 48	15 to 23	8 to 27
Mercia Mudstone - Destructured (IVb)	12 to 32	25 to 50	18 to 24	7 to 26

5.5.3 Particle Size Distribution (PSD)

A summary of the particle size distribution testing of selected samples is presented in Table 12.

Table 13: Summary of Particle Size Distribution (Reworked (V) and Destructured (IVb))

Strata	Clay %	Silt %	Sand %	Gravel %	Cobbles %
Mercia Mudstone - Reworked (V)	90 t	o 98	2 to 10	0 to 1	0

5.5.4 Moisture Content / Dry density relationship

Compaction testing was not undertaken for the Mercia Mudstone (Reworked (V) and Destructured (IVb)) material (using 2.5 kg rammer techniques) including moisture content was undertaken on three samples, with the results summarised in Table 13.

Table 14: Moisture Content-MDD value summary (Reworked (V) and Destructured (IVb))

Stratum	MC (%)	OMC (%)	MDD (Mg/m³)
Mercia Mudstone - Reworked (V)	20	14	1.78
Mercia Mudstone - Destructured (IVb)	19	13 to 15	1.77 to 1.81

5.5.5 Undrained Shear Strength

Two undisturbed samples were subject to Unconsolidated Undrained triaxial testing in the laboratory. An estimate of undrained shear strength can be made by using the empirical relationship between SPT value and plasticity index of Cu=f1*N (after Stroud et al 1989) f1 is conservatively assumed to be equal to 4.4.

Suggested undrained characteristic parameters are summarised in Table 14.

Table 15: Undrained Shear Strength Values ((Reworked (V) and Destructured (IVb))

	Number of tests	Minimum	Maximum	Average
		(kPa)	(kPa)	(kPa)
Mercia Mudstone - Reworked	(V)			
Estimated Cu from SPT 'N' Value	12	5	103	54
Cu Derived from Laboratory Testing	1	98	N/A	N/A
Mercia Mudstone - Destructur	ed (IVb)			
Estimated Cu from SPT 'N' Value	8	10	216	84
Cu Derived from Laboratory Testing	1	160	N/A	N/A

Note: SPT refusals (50+ blows, 6 values) have been removed from the Destructured (IVb) dataset.

5.5.6 Consolidation parameters

Consolidation testing was undertaken during the ground investigation on one sample. This laboratory test has been supplemented with an approximate relationship using plasticity index and SPT N value with a summary in Table 15.

Table 16: Consolidation Values (Reworked (V) and Destructured (IVb))

	Number of tests	Minimum (m²/MN)	Maximum (m²/MN)	Average (m²/MN)
Mercia Mudstone - Reworked	(V)			
Estimated Mv from SPT 'N' Value	12	0.086	1.71	0.30
Mercia Mudstone - Destructur	ed (IVb)			
Estimated Mv from SPT 'N' Value	8	0.041	0.89	0.22

Note: SPT refusals (50+ blows, 6 values) have been removed from the Destructured (IVb) dataset.

The consolidation test (oedometer) results are summarised in Table 16.

Table 17: Consolidation Values (Reworked (V) and Destructured (IVb))

Pressure increments	Mv	Cv
(kPa)	(m²/MN)	(m/yr)
40	0.34	-
80	0.14	9.6
100	0.10	11
200	0.095	11
80	0.023	15

Typical values for the engineering properties of the Mercia Mudstone are provided within CIRIA C570 and indicate good correlation of compressibility with the above results (0.08 m²/MN) for weathered bedrock.

5.5.7 Strength parameters

Constant volume angle of shearing resistance (ϕ 'cv) can be determined for cohesive material using plasticity index values using the relationship provided in BS8002:2015. A summary of the constant volume angle of shearing resistance results are presented in Table 17.

Table 18: Constant volume angle of shearing resistance (Reworked (V) and Destructured (IVb))

	Number of tests	Minimum	Maximum	Average
		(°)	(°)	(°)
Mercia Mudstone - Reworked	(V)			
Constant volume angle of shearing resistance	9	24	31	27
Mercia Mudstone - Destructur	red (IVb)			
Constant volume angle of shearing resistance	11	24	32	28

Typical values for the engineering properties of the Mercia Mudstone are provided within CIRIA C570 and indicate good correlation of effective angle of shearing resistance for weathered bedrock with the above results (25 to 42°).

5.5.8 Stiffness

The undrained Young's modulus has been estimated for the cohesive weathered bedrock using two approaches, the SPT 'N' values using the relationships by Butler (1975) Eu/N = 1.1 MPa and based on the undrained shear strength and over consolidation ratio for a 0.1% strain by Duncan and Buchignani (1976) assuming Eu/Cu = 300.

The drained Young's modulus, E', has been estimated using the SPT 'N' values recorded and the following relationship by Stroud (1989) taken from CIRIA Report 143 (1995): E'/N = 0.9 MPa and also the relationship of 0.75Eu Stroud (1989).

The results are summarised in Table 18 below.

Table 19: Summary of Young's modulus (Reworked (V) and Destructured (IVb))

Number of tests	Minimum	Maximum	Average
-----------------	---------	---------	---------

Mercia Mudstone - Reworked (V)									
Eu (Butler)	12	1	26	13					
Eu (Duncan and Buchignani	12	2	31	16					
E' (CIRIA Report 143 (1995)	12	1	21	11					
E' Stroud (1989)	12	1	23	12					
Mercia Mudstone - D	estructured (IVb)								
Eu (Butler)	14	2	257	210					
Eu (Duncan and Buchignani	14	3	308	90					
E' (CIRIA Report 143 (1995)	14	2	210	61					
E' Stroud (1989)	14	2	231	67					

Typical values for the engineering properties of the Mercia Mudstone are provided within CIRIA C570 and indicate good correlation of stiffness for weathered bedrock with the above results (10 to 100 MPa).

5.5.9 Aggressivity testing

Selected soil samples were sent for aggressivity testing to aid concrete design. Due to the origin of the material, no differentiation has been made between the weathered profiles of the mudstone bedrock. A summary of the test results is presented in Table 19.

Table 20: Aggressivity testing summary (Reworked (V) and Destructured (IVb))

	Number of tests	Minimum	Maximum	Average
Mercia Mudstone - A	II			
Sulphate as SO₄ (mg/l)	4	21	265	88
рН	4	7.3	11	8.8

Note: For practical purposes, testing was not undertaken on the gypsum horizons identified within the bedrock.

5.5.10 Weight density

Weight density of the stratum was determined using published guidance (BS 8002:2015) and the laboratory testing on soil samples from both the compaction testing and one dimensional consolidation testing.

A characteristic weight density value of 18kN/m³ is recommended for this material.

Typical values for the engineering properties of the Mercia Mudstone are provided within CIRIA C570 and indicate a weight density of 1.84kN/m³ for weathered bedrock.

5.6 Mercia Mudstone – Partially Weathered (II)

5.6.1 Overview

The Mercia Mudstone was identified across all three site locations, however only on the Windsor and Ealand sites was it present in a partially weathered state. The full thickness of the stratum was not identified. The mudstone was typically encountered as a mudstone, although interbedded siltstone and gypsum were also recorded within the rotary cored bedrock.

The following summarises the rock mass quality for the mudstone at the site:

- Bedding (or fissures) are sub-horizontal to 10°, thinly laminated to thinly bedded, planar to undulating and smooth to rough.
- Silt and clay smeared fractures were noted throughout.
- RQD ranged from 0 to 57% with an average value of 22%
- SPTs ranged from 45 to 3000 with an average value of 1025

5.6.2 Intact rock strength

Point load index

Axial and diametral point load (Is(50)) tests were undertaken on the Partially Weathered Mudstone. A summary of the point load tests are presented in Table 20.

Table 21: Summary of point load tests (Partially Weathered (II))

	Number of tests	Number of tests Minimum		Average
		(MPa)	(MPa)	(MPa)
Gypsum	12	0.06	1.11	0.58
Mudstone	180	0.01	6.61	0.56
Siltstone	28	0.02	3.86	0.95
Undifferentiated (mudstone / gypsum)	5	0.27	0.99	0.52

Note: A zero value has been removed from the Mudstone dataset above.

Point load test results were also converted into an equivalent UCS value using the following relationship adapted from Das (1995) based on published historical conversions of shale / mudstone test:

PLT Result x 12.6 = Equivalent UCS Value

The results of this relationship are presented in Table 21 below.

Table 22: Summary of UCS equivalent (Partially Weathered (II))

	Number of tests	Minimum	Maximum	Average
		(MPa)	(MPa)	(MPa)
Gypsum	12	0.75	13.9	7.3
Mudstone	180	0.126	83.2	7.01
Siltstone	28	0.25	48.6	12.1
Undifferentiated (mudstone / gypsum)	5	3.4	12.4	6.5

Unconfined compressive strength (laboratory testing)

Unconfined compressive strength (UCS) tests have been undertaken on rock cores in order to obtain information on the strength of rock in unconfined compression.

Interpretation of the results should consider that the more competent layers of rock generally achieve a higher core recovery rate and, as such, there are often more UCS Interpretation of the results should consider that the more competent layers of rock generally achieve a higher core recovery rate and, as such, there are often more UCS tests undertaken on the more competent strata. UCS testing on fractured and layered strata is less frequent due to the limited recovery of intact rock cores.

Four unconfined compressive strength (UCS) tests were undertaken on the undifferentiated mudstone. The recorded UCS ranged from 0.40 to 7.68 MPa with an average of 4.3 MPa. The range corresponds to very weak to moderately weak strengths and corresponds to the logged strength of the rock. No correlation with Is(50) could be established due to the range in UCS and limited Is(50) tests at the UCS test locations.

Rock mass strength

Rock mass parameters have been interpreted using the Hoek-Brown criterion. The rock mass parameters for the intact material is $\varphi' = 17^{\circ}$ and c' = 23 kPa. For the purposes of design, parameters should be developed in a location specific basis. These rock mass parameters for the intact material are based on the input parameters assuming general condition applied and disturbed by excavation works.

Typical values for the engineering properties of the Mercia Mudstone are provided within CIRIA C570. The effective friction angle presented within C570 records a published value of >40°, which is greater than the values derived above. The cause of this discrepancy is likely to be the conservative approach to the input parameters selected within this report.

Rock mass stiffness

The deformation modulus for the rock mass, Em, has been determined from the relationship:

Em = jMrquc, where Mr = 75 for mudstones (Tomlinson, 2001).

An average RQD of 22 % has been recorded for the mudstone, giving a lower bound j value of 0.20 (Tomlinson, 2001). A summary of the rock mass stiffness has been derived based on the above equation using the equivalent UCS value and is presented in Table 22.

Table 23: Summary of rock mass stiffness (Partially Weathered (II))

	Number of tests	Minimum	Maximum	Average
		(MPa)	(MPa)	(MPa)
Gypsum	12	11.34	209.79	109.93
Mudstone	185	1.89	1249.29	105.00

Siltstone 28 3.78 729.54 180.90

Rock mass stiffness is heavily influenced by the quality of the rock mass and sensitive to the GSI. Any local disturbance of the ground from weathering could affect and significantly adjust the inputs assumed for the calculation.

Typical values for the engineering properties of the Mercia Mudstone are provided within CIRIA C570 and indicate good correlation of rock mass stiffness with the above results (100 to 1200 MPa).

5.6.3 Weight density

A characteristic weight density of 20kN/m³ has been selected based upon published values outlined within Cripps and Taylor (1981).

6. Preliminary Geotechnical Assessment

6.1 Earthworks

The ground investigation identified both natural and Made Ground granular and cohesive deposits. Grading has established a range of suitable earthwork engineered materials present on site in accordance with the Series 600 Specification for Highway Works.

The majority of the Made Ground (both cohesive and granular) should be anticipated to be initially classified as Class U1A due to the unsuitable material identified (oversized and organic material) within the field descriptions. However, after the made ground materials are screened and suitable material selected, it is expected that the majority of the soils won from the site within the granular Made Ground deposits will be potentially classified by grading as Class 1 general granular fill.

Within the Sutton Sand Formation, both cobbles and organic peat were identified. Cobble size particles larger than 125 mm in diameter shall not be used on site, and should be removed from the material prior to use. Any deleterious and/or organic material shall be removed before reuse. It is important prior to placement of filling, to remove any soft, organic, permeable and other undesirable materials from the final surface if present. Any depressions in the surface and any areas where undesirable material has been removed from the subgrade will require filling and subsequent compaction to allow a suitable surface for construction to be prepared.

Based on the grading of the Sutton Sand Formation, it is considered that the majority of the samples would be classified after screening as either general cohesive fill, Class 2 (A, B, C)

Compaction testing was undertaken and indicated Sutton Sand Formation and weathered bedrock was wet of optimum. Initial compaction results on the material in its' in-situ condition indicates the materials can achieve a dry density corresponding to a minimum of 90% maximum dry density and less than 10% air voids at the natural field moisture content.

Prior to re-use, all materials should be classified in accordance with the materials identified in the Specification for Highway Works. Whilst recommendations are given on the expected classifications of the strata on site, these should be reassessed prior to compaction with regard to both soil types and requirements of the earthworks. Recommendations have been given on the basis that works will be for general fill, but compaction requirements will change if the materials are being used as structural fill instead. These materials should then be placed and compacted in accordance with Specification for Highway Works, Table 6/4, in accordance with all relevant clauses.

All earthworks shall be undertaken in accordance with BS6031:2009 - Code of Practice for Earthworks.

Surveys of each placed layer should be undertaken to ensure that the specified levels and layer thicknesses are satisfied. These surveys can be used to calculate any future settlement and be used to produce 'as-built' drawings to validate construction. Field trials are recommended prior to construction to ensure appropriate performance of Site won re-compacted material can be fulfilled.

6.2 Excavations

The Made Ground and Sutton Sand Formation are usually easy to excavate using standard plant but immediate support is often required. Groundwater control measures will be necessary where soils are below the water table and consideration should be made for retaining structures as part of temporary works. Care should be taken in excavations where peat is encountered as it is a soft and highly compressible part of the strata.

As per the guidance provided in CIRIA Report 97, slope angles of 35 to 45 degrees in firm clays, and 40 to 45 degrees in stiff clay are deemed suitable for temporary slopes (up to 14 days) in cuts up to about 3.0 m high in dry conditions. In granular materials slope angles of 30 to 35 degrees could potentially be achieved in the short term. However, given the high elevation of groundwater at Site, this may not be applicable.

Long term batters for any proposed slopes will require additional analysis or retaining structures being specified, again which would also need assessment during detailed design.

6.3 Groundwater

Groundwater strikes were recorded across the different areas of the project within natural soil, Made Ground and rock. Relatively shallow groundwater has been identified during the groundwater monitoring phase.

Where shallow groundwater is identified, this level would not be conducive for the construction of shallow foundations or excavations to proposed structures unless significant dewatering was to be undertaken. Where dewatering is proposed a detailed assessment should be undertaken in order as a minimum to confirm there is no adverse impact on adjacent land users or structures.

6.4 Chemical environment for concrete

Based on soils laboratory testing, concrete will need to be designed to a minimum classification of ACEC classification DS-3 AC-3. Ultimately the DC class is dependent on the design life of the structure and the recommendations of BS8500 should be sought, however, recommendations made by the designers may supersede this guidance.

It should further be noted that gypsum is commonly present in the Mercia Mudstone bedrock can be aggressive to concrete and the designer should also take the potential effects of potential ground condition into account.

7. Geotechnical Risk Register

The geotechnical risks for the scheme are summarised below using a qualitative assessment based on CD 622 Managing Geotechnical Risk (National Highways, 2020).

Note that the Geotechnical Risk Register is intended as a working document which should be updated and revised throughout the duration of the project.

Under a qualitative assessment, the degree of risk is the expected impact of damage, loss or harm for a given hazard based on the following:

Degree of Risk = Likelihood x Severity

The likelihood and the severity are determined as the table below, which then provides the degree of risk based on

Table 24: Scale of Likelihood & Severity

Likelihood	Scale	х	Severity	Scale
Very likely	5		Very high	5
Likely	4		High	4
Possible	3		Medium	3
Unlikely	2		Low	2
Very unlikely	1		Very low	1

Table 25: Degree of Risk

Degree of Risk	Risk Level	Recommended Response
1 to 4	Negligible	None
5 to 9	Minor	Consider attention
10 to 14	Moderate	Attention required
15 to 19	Substantial	Attention urgently required
20 to 25	Severe	Work must not commence until risk is mitigated or reduced.

The Geotechnical Risk Register is provided in Table 26 overleaf. The register records the anticipated geotechnical hazards associated with the site and the potential consequences. The risks prior and after control measures has been assessed qualitatively as described above.

Table 26: Geotechnical Risk Register

Hazard		or to		Consequence	Control Measure	Aft Co	er ntro	ı
	L	S	R			L	s	R
Varying ground conditions	4	5	20	Unsuitable founding material. Excessive settlement, bearing failure, project costs and delays. Increased temporary works requirements.	Contingency for additional excavations. Allowance for observational method of design in detailed design phase. Conservative design. Contractor to carry out supplementary investigation as required for specific features. Undertake a watching brief during construction.	3	5	15
Soft compressible / loose soils (peat)	5	5	25	Unsuitable founding material. Excessive settlement, bearing failure, project costs and delays. Increased temporary works requirements. Change in design.	Allowance for observational method of design in detailed design phase.	3	5	15
Shallow groundwater	3	4	12	Uplift. Damage to structures, remedial works unsuitable, temporary works constraints. Dewatering required	Conservative design. Temporary work design more rigorous. Watching brief to establish assumptions in design valid. Specialist dewatering contractor to be appointed for design of any dewatering works.	2	4	8
Aggressive ground conditions	3	4	12	Damage to structures, long term performance of structure	Ensure suitable specification. Additional testing or conservative assumptions on material and classification.	2	4	8
Contaminated land	3	4	12	Temporary works constraints, human health and sensitive receptors damage. Waste disposal / reuse of material implications.	Watching brief. Temporary works design considerations. Plans to consider the removal of any grossly contaminated materials identified. Should reuse of materials be required a DoWCoP MMP might be required. This would need to be approved and validated prior to the reuse of materials within the project.	2	4	8
Unexploded ordnance	2	5	10	Project costs and delays. Increased temporary works requirements.	Further risk assessment to be considered as appropriate. Temporary works considerations.	1	5	5
Known or unknown services	3	4	12	Project costs and delays. Increased temporary works requirements. Change in design.	Watching brief. Service plans obtained. Industry standard practices to be undertaken as a minimum. Additional allowance for diversion of communications and/or services. Early discussion with utility company to agree to design, construction and maintenance regime.	2	4	8

Adjacent / existing structures 3 4 12 Damage from construction and temporary works Detailed design to consider settlement. Watching brief during works. 2 4 8 Instrumentation on sensitive structures.

Appendices

Appendix A

Ground Investigation Factual Report



CROWLE FLOOD ALLEVIATION, LINCOLNSHIRE

GROUND INVESTIGATION REPORT (FACTUAL ACCOUNT OF FIELDWORK, MONITORING AND LABORATORY TESTING)

Report No F2033-22

February 2023

Issue No 1

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Report No F2033-22

ISSUE No	DATE	STATUS	PREPARED BY	CHECKED BY	APPROVED BY
1	Jan 2023	Draft report			
1.1	Jan 2023	Draft report (including laboratory results for WS04-E and WS09-C)			
1	Feb 2023	Final report			

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1 INTRODUCTION

SOCOTEC UK Limited (SOCOTEC) was commissioned in June 2022 by Severn Trent Water Ltd (STW) to carry out a ground investigation to facilitate the proposed design of two sewage pumping stations, two rising mains and a number of gravity sewers as part of the flood alleviation scheme in Crowle and Ealand.

The scope of the investigation was specified by GHD and comprised boreholes, monitoring, laboratory testing and reporting. The fieldwork was carried out in two phases between 26 September and 26 October 2022 and between 7 and 8 December 2022.

The investigation was performed in accordance with the contract specification, and the general requirements of BS 5930:2015+A1 (2020), BS EN 1997-2 (2007), BS EN ISO 22475-1 (2021) and other relevant related standards identified.

This report presents a description of the ground investigation work carried out together with the factual records of the fieldwork, monitoring and laboratory testing. It comprises the Factual Account section of a Ground Investigation Report (GIR), as defined in the UK Specification for Ground Investigation draft Third Edition (2022), also identified as the Factual Report section in BS 5930:2015+A1 (2020). The information is also presented in digital data format as defined in AGS 4.0.4 (2017).

2 SITE SETTING

2.1 Location and Description

The site is located between Crowle and Ealand, approximately 13 km west of Scunthorpe, around National Grid reference SE 774125, see Site Location Plan in Appendix A. The site is divided into four sections which are predominantly located in residential areas.

- Windsor comprising Windsor Road, Windsor Lane and the field beside Windsor Crescent.
- Ealand comprising New Trent Street and Main Street.
- Axholme comprising Wharf Road and the grounds of Axholme Academy.
- Commonside comprising the south end of Commonside.



2.2 Published Geology

The published geological map for the area, BGS Sheet 79 (Drift, 1971 and Solid, 1972) and 88 (1969), and the BGS GeoIndex Onshore online viewer (2023) show the site predominantly located on superficial deposits of the Sutton Sand Formation. The exploratory holes in the far north are close to the boundary with Alluvium and two of the exploratory holes in the south have no superficial deposits recorded. The area is underlain by the Triassic Mercia Mudstone Group.

3 FIELDWORK

3.1 General

The exploratory hole locations were selected by GHD and set out from local features following a GPR survey carried out by SOCOTEC. The as-drilled positions were surveyed by SOCOTEC to National Grid and Ordnance Datum using a GPS, and the locations are shown on the Site Plan in Appendix A.

A number of exploratory holes were positioned in roadways and required traffic management measures.

3.2 Exploratory Holes

The exploratory holes are listed in Table 1.

TABLE 1 SUMMARY OF EXPLORATORY HOLES

ТҮРЕ	QUANTITY	DEPTH RANGE (m)	REMARKS
Cable percussion boring extended by rotary core drilling	2	20.00 to 24.00	BH01-W and BH02-E
Dynamic (windowless) sampling	9	2.80 to 6.00	WS01-W, WS02-W, WS03-E, WS04-E, WS05-A, WS06-A, WS07-A, WS08-A, WS09-C

The exploratory hole logs are presented in Appendix B. These include descriptions of the strata encountered together with details of the equipment and methods used, sampling and field testing

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carried out, water depths and other field observations. Explanations of the terms and abbreviations used on the logs are given in the Key to Exploratory Hole Records in Appendix B, along with other explanatory information. The geological material descriptions are in accordance with BS 5930:2015+A1 (2020), following BS EN ISO 14688-1 (2018) and BS EN ISO 14689 (2018) for soils and rocks respectively.

Standard penetration tests (SPT) in the boreholes were carried out in accordance with BS EN ISO 22476-3+A1 (2011). SPT hammer energy ratio certificates are included in Appendix B. The results are presented on the logs without any corrections to the measured blow-counts or derived N values.

Geotechnical samples were transferred from site to the Deeside office of SOCOTEC for temporary retention. Samples taken for geoenvironmental testing were transferred directly from site to the SOCOTEC environmental chemistry (Env Chem) laboratory (see Section 4).

Photographs of the dynamic (windowless) sampling liners and rotary drilled cores are presented in Appendix F.

3.3 Groundwater and Ground Gas Monitoring

Ground gas and groundwater monitoring instrumentation was installed in selected boreholes specified by GHD; details are shown on the logs and summarised in Appendix C.

Monitoring carried out by SOCOTEC during and after the main fieldwork period is listed in Table 2. The records are included in Appendix C.

TABLE 2 SUMMARY OF MONITORING

TYPE	REMARKS
Groundwater and gas monitoring visits during fieldwork period	27 October 2022 (WS02-W, WS05-A and WS06-A only)
Groundwater and gas monitoring visits after fieldwork period	21 November, 8 and 19 December 2022
Well development	21 November 2022
Water sampling	8 December 2022

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3.4 Groundwater Sampling

Sampling of groundwater from installations in BH01-W, WS02-W, WS05-A and WS06-A was carried out by SOCOTEC following the main fieldwork period on 8 December 2022. The results of subsequent laboratory testing on the samples are included in Appendix E.

4 LABORATORY TESTING

4.1 Geotechnical Testing

Geotechnical laboratory testing of selected samples was scheduled by GHD. The testing was carried out by Geolabs in Watford, in accordance with test methods as stated within the test reports. The scope of testing is listed in Table 3 and the results are presented in Appendix D.

TABLE 3 SUMMARY OF GEOTECHNICAL LABORATORY TESTS

TEST TYPE ¹	QUANTITY	REMARKS
Classification/index tests		
Water content	26	
Atterberg limits	25	
Particle size distribution	10	By sieving and sedimentation
Strength tests		
Unconsolidated undrained triaxial compression	2	
Compaction / earthworks tests		
Compaction (light) 2.5 kg	4	
Consolidation tests		
One-dimensional (oedometer) consolidation	1	
Geochemical tests		
pH and sulphate contents	13	BRE SD1 Suite A (Two results presented in Appendix E)
·	2	BRE SD1 Suite C
Organic matter content	6	
Rock tests		
Point load index	228	



TEST TYPE ¹	QUANTITY	REMARKS
Uniaxial compressive strength	4	
Water content	132	

4.2 Geoenvironmental Testing

Geoenvironmental laboratory testing was scheduled by GHD on selected soil samples recovered during the fieldwork, and water samples taken by SOCOTEC from the installations. The testing was carried out by SOCOTEC at the Env Chem laboratory at Bretby, near Burton-on-Trent, in accordance with test methods as stated within the test reports. The scope of testing is listed in Table 4 and the results are presented in Appendix E.

TABLE 4 SUMMARY OF GEOENVIRONMENTAL LABORATORY TESTS

ТҮРЕ		QUANTITY	REMARKS
Soil	Suite E (1)	15	Arsenic, Cadmium, Copper, Chromium, Lead, Mercury, Nickel, Selenium, Vanadium, Zinc, Boron, Chromium VI, Chloride, pH, Electrical Conductivity, Sulphate as SO4 (water soluble), Sulphate as SO4 (acid soluble), Sulphide, Soil Organic Matter, Cyanide (total), Cyanide (free), Cyanide (complex), 17 PAHs (inc. Coronene), Asbestos Stage 1 with Stage 2 & 3 Trigger, Redox Potential in Soil.
	Suite E (2)	7	TPH CWG (C5-C35) inc. GRO BTEX, BTEX & MTBE, VOCs, SVOCs, Phenol Index.
Water	Suite F	4	Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Vanadium, Zinc, Barium, Beryllium, Boron, Calcium, Magnesium, Potassium, Sodium, Chromium VI, Total Hardness as CaCO3 in Water, pH, Sulphide, Total Sulphur as S (Diss.) in Water, Total Sulphur as SO4 (Diss.) in Water, Cyanide (free), Cyanide (total), Electrical Conductivity, Ammoniacal Nitrogen as N, Chloride, Nitrate as N, Phenol Index, 17 PAHs (inc. Coronene), TPH CWG (C5-C35) inc. GRO & BTEX
	VOC	4	
	SVOC	4	
	РСВ	4	PCBs, CLEA 12 Congeners



5 REFERENCES

- AGS: 2017: Electronic Transfer of Geotechnical and Geoenvironmental Data (Edition 4.0.4 February 2017). Association of Geotechnical and Geoenvironmental Specialists.
- BGS England and Wales Sheet 79 : 1971 : Goole. 1:63360 geological map (Drift). British Geological Survey.
- BGS England and Wales Sheet 79: 1972: Goole. 1:63360 geological map (Solid). British Geological Survey.
- BGS England and Wales Sheet 88 : 1969 : Doncaster. 1:63360 geological map (Solid and Drift). British Geological Survey.
- BGS GeoIndex Onshore: 2023. www.bgs.ac.uk. British Geological Survey.
- BRE Special Digest 1: 2005: Concrete in aggressive ground. Building Research Establishment.
- BS 10175:2011+A2:2017: Investigation of potentially contaminated sites Code of practice
- BS 5930:2015+A1 : 2020 : Code of practice for ground investigations.
- BS EN 1997-2 : 2007 (Incorporating corrigendum June 2010) : Eurocode 7 Geotechnical design Part 2 Ground investigation and testing.
- BS EN ISO 14688-1:2018 : Geotechnical investigation and testing Identification and classification of soil Part 1 Identification and description
- BS EN ISO 14688-2:2018 : Geotechnical investigation and testing Identification and classification of soil Part 2 Principles for a classification
- BS EN ISO 14689:2018 : Geotechnical investigation and testing Identification, description and classification of rock
- BS EN ISO 22475-1 : 2006 (reproduced 2007) : Geotechnical investigation and testing Sampling methods and groundwater measurements Part 1 Technical principles for execution.
- BS EN ISO 22476-3:2005+A1 : 2011 : Geotechnical investigation and testing Field testing Part 3 Standard penetration test.
- CS 229 : 2020 : Data for pavement assessment. Design Manual for Roads and Bridges. Highways England
- ISRM: 2007: The Complete ISRM Suggested Methods for Rock Characterisation, Testing and Monitoring (1974-2006). Commission on Testing Methods, International Society for Rock Mechanics (Editors Ulusay R & Hudson JA).
- UK Specification for Ground Investigation. Third edition: 2022: ICE Publishing. Thomas Telford Ltd

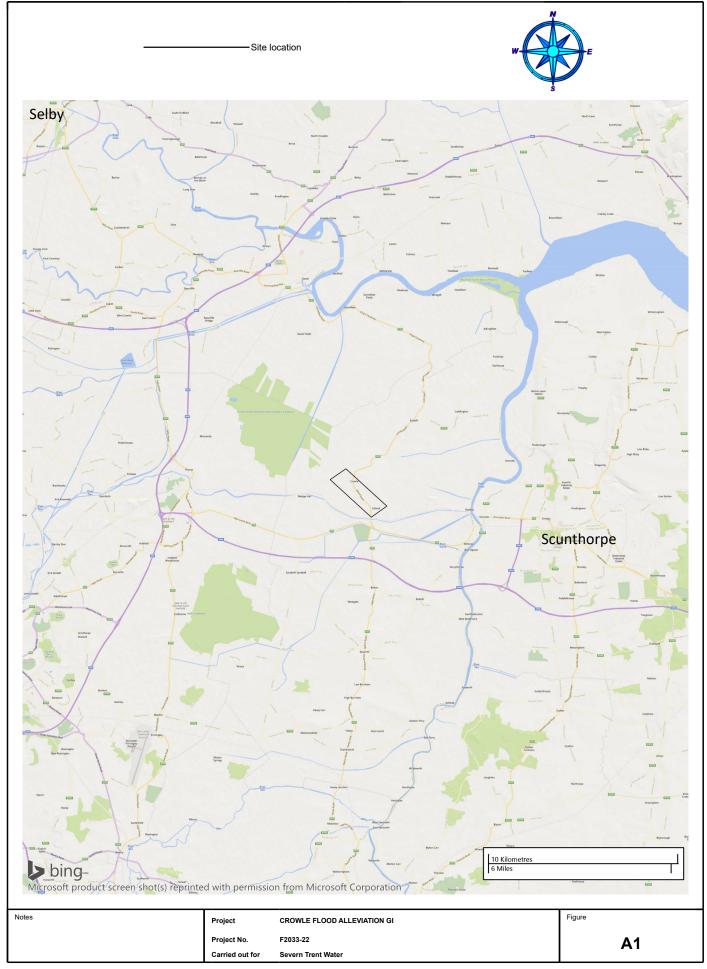


APPENDIX A FIGURES AND DRAWINGS

Site Location Plan	A1
Site Plan – Windsor	A2-1
Site Plan – Ealand	A2-2
Site Plan – Axholme	A2-3
Site Plan – Commonside	A2-4

Site Location Plan



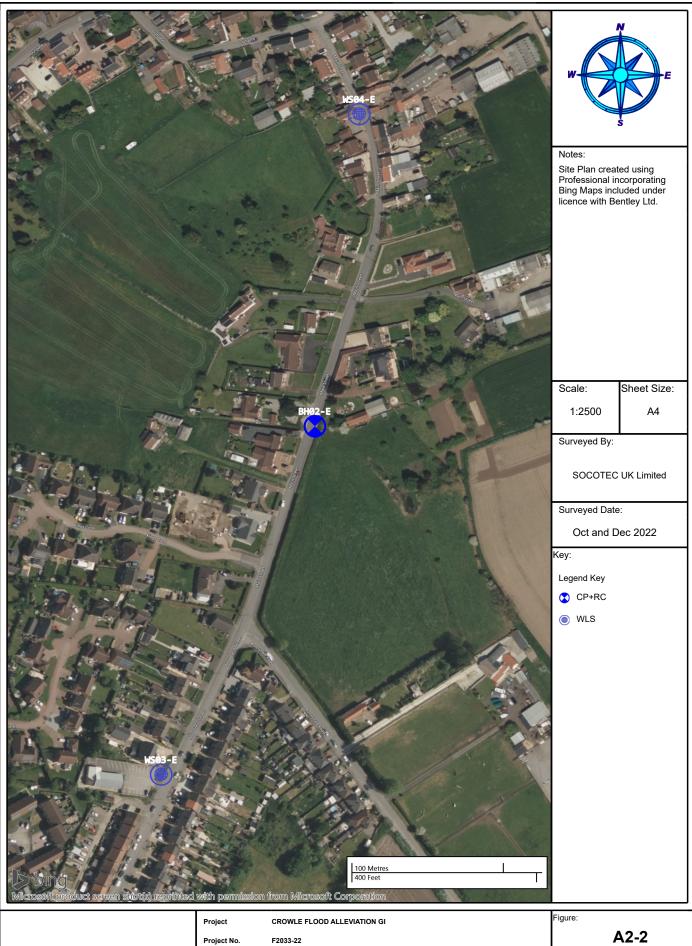






Carried out for





Carried out for

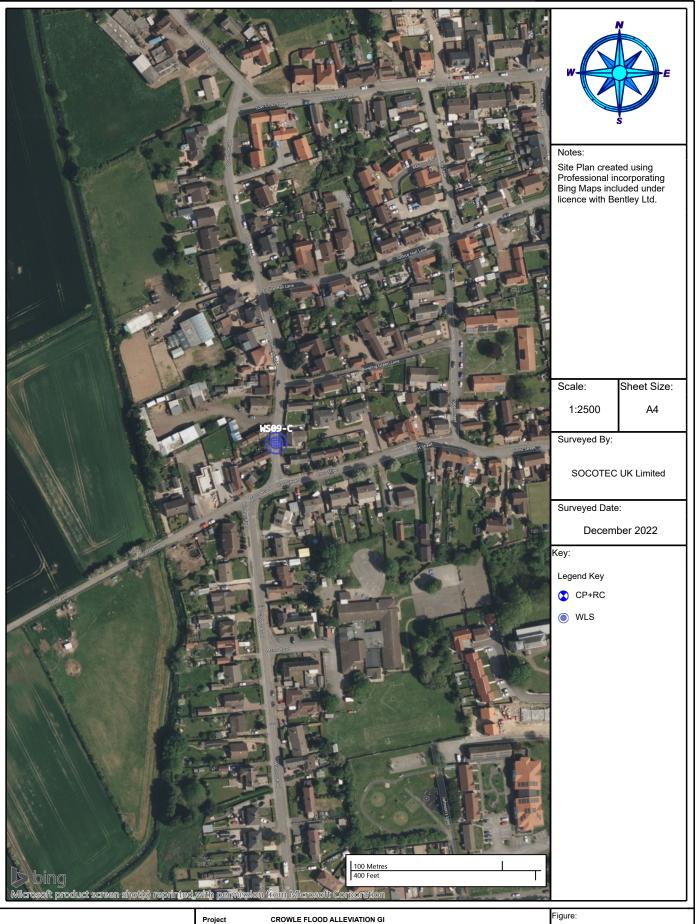




Carried out for



A2-4



Project No.

Carried out for

F2033-22



APPENDIX B EXPLORATORY HOLE RECORDS

Key to Exploratory Hole Records

Key

Hammer Energy Ratio Reports

Hammer References Dart 428, Dart 534, TH53,

TH66 and TH70

BH01-W and BH02-E

Borehole Logs (Cable Percussion and

Rotary)

Borehole Logs (Dynamic (windowless)

Sampling)

WS01-W, WS02-W, WS03-E, WS04-E, WS05-A, WS06-A, WS07-A, WS08-A, WS09-C

Key to Exploratory Hole Records



SAMPLES

Undisturbed

U Driven tube sample

UT Driven thin wall tube sample nominally 100 mm diameter and 100% recovery unless otherwise stated
TW Pushed thin wall tube sample

P Pushed piston sample CBR CBR mould sample

BLK Block sample

C Core sample (from rotary core) taken for laboratory testing.

Disturbed

D Small sample (including samples recovered from SPT)

B Bulk sample

LB Large Bulk sample (comprising more than one container as required)

Other

W Water sample
G Gas sample
ES Soil sample

Water sample Environmental chemistry samples (in more than one container where appropriate)

Comments to samples

Sequential sample reference numbers are assigned to every sample taken during hole construction.

NR - No Recovery. Used where tube sampling has been attempted but no sample obtained (for whatever reason).

Samples not shown on exploratory hole logs:

• subsamples / specimens taken for on-site testing, eg point load testing

· samples taken from borehole installations (ie water or gas) after hole construction

DYNAMIC SAMPLING Dynamic sampling includes 'window' and 'windowless' sampling methods, with and without a sample liner respectively

Dys Dynamic sampling range showing tube / liner recovery (rec.) and diameter. Material retained as separate samples.

L Retained complete liner sample (with sample reference number)

IN SITU/FIELD TESTS

SPT S or SPT C Standard Penetration Test, open shoe (S) or solid cone (C). The Standard Penetration Test is defined in BS EN ISO

22476-3:2005+A1:2011. The open shoe configuration is used without a sample liner unless shown otherwise. Samples

recovered by SPT open shoe are shown as type D.

The incremental blow counts are given in the Field Records column; each increment is 75 mm unless stated otherwise and any penetration under self-weight in mm (SW) is noted. Where the full 300 mm test drive is achieved the total number of blows for the test drive is presented as N = ** in the Test column. Where the test drive blows reach the limiting value (usually 50) the total blow count beyond the seating drive is given (without the N = prefix). See Note 7 also.

IV in situ/field vane shear strength, peak (p) and remoulded (r), kPa
HV Hand vane shear strength, peak (p) and remoulded (r), kPa
PP Pocket penetrometer test, converted to shear strength, kPa

KFH, KRH, KPI Permeability tests: KFH = falling head, KRH = rising head, KPI = packer inflow (water pressure test). Results presented

on separate report sheets.

PID VOC concentration using hand-held photo-ionisation detector, ppmv

DRILLING RECORDS

Classification of discontinuity state - as defined in BS 5930:2015+A1:2020

TCR Total Core Recovery, %
SCR Solid Core Recovery, %
RQD Rock Quality Designation, %

If Fracture spacing, mm - presented as minimum, mode (or 'typical' value) and maximum spacing.

FI Fracture Index - presented as number of fractures per metre.

NI Non-intact - used to indicate where the core is fragmented (ie non-Solid Core).

NA Not-applicable - used where a measurement is inappropriate (eg for non-rock materials, zones of no recovery)

NIDD Non-intact Drilling Induced – used to indicate where rock believed to be non-fractured in the ground has been recovered

as Non-intact due to the drilling process. (Used only where specified)

NDP No Discontinuities Present – used to indicate where core is non-fractured. (Used only where specified as alternative

representation to showing a single If value for the depth range of non-fractured core.)

CRF Core Recovered in the Following run (length in m) – used to indicate length adjustment to TCR (and SCR, RQD and If

accordingly) where slipped/dropped core from a core run has been recovered in the subsequent run.

ASSESSED Zone of Core Loss – used to indicate estimated depth range corresponding to core loss (for TCR<100 %).

Assumed to be at the start of the core run where no judgement is possible. Not shown for core loss less than 5 %.

Flush returns – presented as estimated percentage in the Records column, with colour where relevant.

Notes:

See report text for full references of standards.

Updated Oct 2022 v1.4 col

Key to Exploratory Hole Records



GROUNDWATER Groundwater entry ∇ Depth to groundwater after observation period **INSTALLATIONS** Any installations are shown on the Exploratory Hole Record in the rightmost Backfill column with appropriate graphic. Standpipe/ piezometer SP Standpipe SPIE Standpipe piezometer Piezometer PPIE Pipe Pneumatic piezometer Tip Electronic piezometer Inclinometer or Slip Indicator **ICE** Biaxial inclinometer Inclinometer tubing for use with probe ICM Slip indicator SLIP Settlement **Pressure Cells Points ESET** Electronic settlement cell/gauge **EPCE** Electronic embedment pressure cell Magnetic extensometer settlement point **PPCE** Electronic push-in pressure cell **INSTALLATION /** A legend describing the installation is shown in the rightmost column. Legend symbols used to describe the backfill **BACKFILL** materials are indicated below. **LEGENDS** Macadam Concrete Grout Bentonite Sand Gravel Arisings **STRATUM** The legend symbols used for graphical representation of soils, rocks and other materials on the borehole logs are shown below. For soils with significant proportions of secondary soil types, a combination of two or more symbols is used. **LEGENDS** Note that the Made Ground / Fill stratum legend does not differentiate between engineered and non-engineered anthropogenic materials. Peat Macadam Concrete Made Ground / Fill Void or No Information ماد عادي Sand Silt Gravel Cobbles **Boulders** Coal 000 Conglomerate Chalk Mudstone Siltstone Sandstone Breccia Limestone Metamorphic Igneous Metamorphic Metamorphic Tuff Igneous Igneous (Fine) (Med) (Coarse) (Fine) (Med) (Coarse)

Key to Exploratory Hole Records



NOTES

- 1 **Geological materials** are described in accordance with BS 5930:2015+A1:2020, which is compliant with BS EN ISO 14688-1:2018 and 14689-1:2018 for soils and rocks respectively.
- The **consistency** determined during description for fine soils (clay and silt) is reported for strata where undisturbed samples are available. Where the logger considers that the samples may not be representative of the in situ condition, for whatever reason, the reported consistency may be omitted, or qualified using the terms *Probably*, where the logger is reasonably confident of the assessment, or *Possibly*, where there is less certainty.
- The presence of **very coarse particles** (cobbles and boulders) is included in the stratum descriptions on logs using the proportional terminology of BS 5930 where possible. However, due to their relatively large size in relation to the diameter of boreholes, and volumes of samples recovered, these records may not be fully representative of their size and frequency in the ground. Where sample mass precludes a reliable estimate of the proportion of very coarse particles, their presence may be described using undefined qualitative terms, eg occasional, frequent, etc, or by noting the number of cobbles/boulders observed.
- The **declination of bedding and joints** is given with respect to the normal to the core axis, ie perpendicular to the direction of drilling. In a vertical borehole this will therefore correspond to the dip.
- The assessment of **SCR**, **RQD** and **Fracture Spacing** excludes all non-natural fractures (ie drilling induced) where these can be positively identified.
- Observations of discernible **groundwater entries** during the advancement of the exploratory hole are given at the foot of the log and in the Legend column. The absence of a recorded groundwater entry should not, however, be interpreted as a groundwater level below the base of the borehole. Under certain conditions groundwater entry may not be observed, for instance, drilling with water flush or overwater, or boring at a rate faster than water can accumulate in the borehole. Similarly, where water entry observations do exist, groundwater may also be present at higher elevations in the ground than where recorded in the borehole. In addition, where appropriate, water levels in the hole at the time of recovering individual samples or carrying out in situ tests and at shift changes are given in the Records column.
- The borehole logs present the results of **Standard Penetration Tests** recorded in the field without correction or interpretation. However, in certain ground conditions (eg high hydraulic head or where very coarse particles are present) some judgement may be necessary in considering whether the results are representative of in situ mass conditions.
- B Date Time Casing Water

 Overnight pauses in hole progress are shown by a horizontal line together with records of casing depth and water level at the start and end of shift, together with the corresponding date and time. Casing depth and water levels are also shown at the time of tube sampling and Standard Penetration Tests.

REFERENCES

- BS EN ISO 14688-1:2018 : Geotechnical investigation and testing Identification and classification of soil. Part 1 Identification and description. British Standards Institution
- BS EN ISO 14689 : 2018 : Geotechnical investigation and testing Identification and classification of rock. British Standards Institution
- 3 BS EN ISO 22476-3:2005+A1 : 2011 : Geotechnical investigation and testing Field testing. Part 3 Standard penetration test. British Standards Institution
- 4 BS 5930:2015+A1:2020 : Code of practice for ground investigations. British Standards Institution

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

ARCHWAY ENGINEERING (UK) LTD AINLEYS INDUSTRIAL ESTATE

ELLAND

WEST YORKSHIRE

HX5 9JP

SPT Hammer Ref: DART 428

Test Date:

08/09/2022

Report Date:

08/09/2022

File Name:

Dart 428.spt

Test Operator:

CM

Instrumented Rod Data

Diameter d_r (mm):

54

Wall Thickness t_r (mm):

6.3

Assumed Modulus Ea (GPa): 208

Accelerometer No.1:

7080

Accelerometer No.2:

11609

SPT Hammer Information

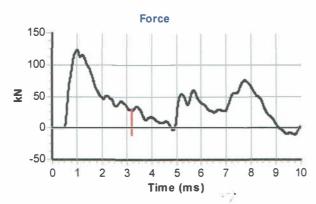
Hammer Mass m (kg): 63.5

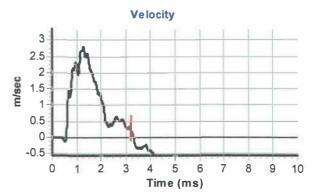
Falling Height h (mm): 760

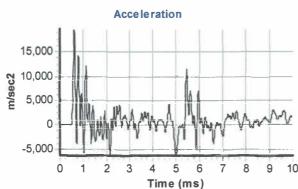
SPT String Length L (m): 10.0

Comments / Location

PM SAMPLING/74532









Calculations

Area of Rod A (mm2):

944

Theoretical Energy E_{theor} (J):

473

Measured Energy E_{meas} (J):

319

Energy Ratio E, (%):

67

The recommended calibration interval is 12 months



SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

ARCHWAY ENGINEERING (UK) LTD AINLEYS INDUSTRIAL ESTATE

ELLAND

WEST YORKSHIRE

HXS 93P

SPT Hammer Reft: DARTS34

Test Date: 24/11/2021

Report Data: 26/11/2021 File Name: DARTS34.sot

Test Operator: 3L

Instrumented Rod Data

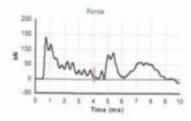
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Wall Thickness tr. (mm): 6.0
Assumed Modulus E₈ (GPa): 200
Accelerometer No.1: 7080
Accelerometer No.2: 11609

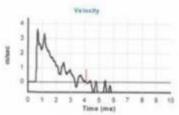
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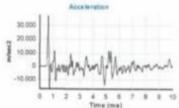
Hammer Mass m (kg): 63.5 Falling Height h (mm): 760 SPT String Length L (m): 10.0

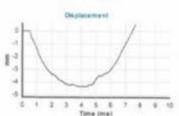
Comments / Location

D & | DRILLING - 76666









Calculations

 Area of Rod A. (mm2):
 905

 Theoretical Energy E_{theor} (3):
 473

 Measured Energy E_{meas} (3):
 329

Energy Ratio E, (%):

70

The recommended calibration interval is 12 months



Socotec Central

Progress close

CV2 3TF

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

SPT Hammer Ref: TH53

Test Date: 06/07/2022

Report Date: 06/07/2022

File Name: TH53.spt

Test Operator:

Instrumented Rod Data

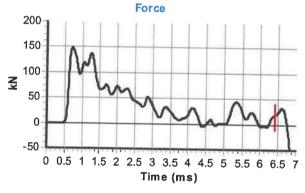
Accelerometer No.2:

Diameter d_r (mm): 54 Wall Thickness t_r (mm): 6.7 Assumed Modulus E_a (GPa): 208 Accelerometer No.1: 72570

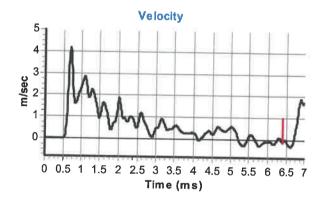
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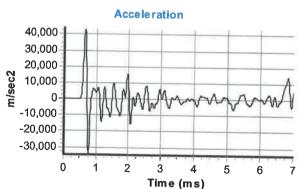
Hammer Mass m (kg): 63.5 Falling Height h (mm): 760 SPT String Length L (m): 15.0

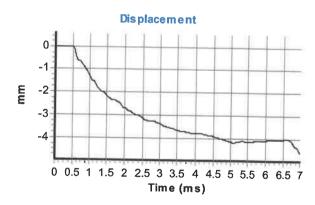
Comments / Location



72571







Calculations

Area of Rod A (mm2): 996 Theoretical Energy E_{theor} (J): 473 Measured Energy E_{meas} (J): 353

Energy Ratio E_r (%):

75



Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005



Dynamic Sampling Uk Ltd Unit 8 Victory Park Victory Road Derby **DE24 8ZF**

Hammer Ref:

TH66

Test Date:

17/03/2022

Report Date:

17/03/2022

File Name:

TH66.spt

Test Operator:

Hammer Information

Hammer Mass m (kg): 63.5

760 Falling Height h (mm):

10.0 String Length L (m):

Comments / Location



54 Diameter d_r (mm):

6.5 Wall Thickness t_r (mm):

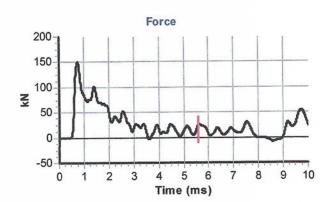
Assumed Modulus Ea (GPa): 208

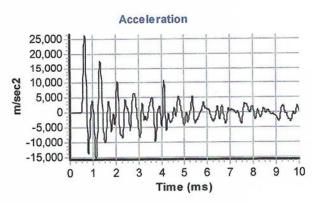
Accelerometer No.1:

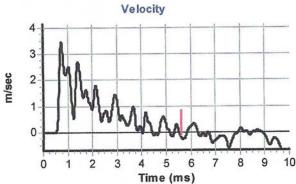
62901

Accelerometer No.2:

62902









Calculations

Area of Rod A (mm2):

970

Theoretical Energy Etheor (J):

473

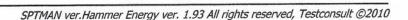
Measured Energy E_{meas}

306

Energy Ratio E r (%):

65

The recommended calibration interval is 12 months



Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005



Dynamic Sampling Uk Ltd Unit 8 Victory Park Victory Road Derby **DE24 8ZF**

Hammer Ref:

TH70

Test Date:

17/03/2022

Report Date:

17/03/2022

File Name:

TH70.spt

Test Operator:

Instrumented Rod Data

Diameter d_r (mm):

54

Wall Thickness t_r (mm):

6.5

Assumed Modulus Ea (GPa): 208

Accelerometer No.1: Accelerometer No.2:

62901 62902

Hammer Information

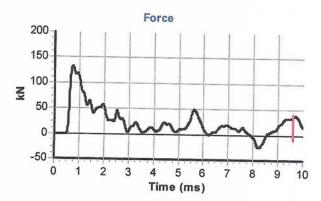
Hammer Mass m (kg): 63.5

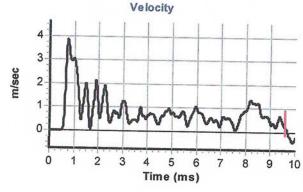
Falling Height h (mm): 760

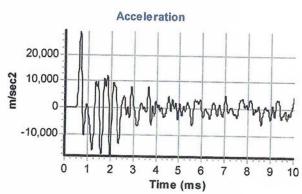
String Length L (m):

10.0

Comments / Location









Calculations

Area of Rod A (mm2):

970

Theoretical Energy E_{theor} (J):

473

Measured Energy E_{meas} (J):

312

Energy Ratio E_r (%):

66

The recommended calibration interval is 12 months



0
COCOTE

0.00 1.20 9.91	0 - 9.91 1	Dates 3 Oct 22 - 18 Oct 3 Oct 22 - 18 Oct) Oct 22 - 21 Oct	t 22 C	Meth Hand dug inspecti Cable percussion Rotary coring	ion pit to 1. boring to 9.	.91m.	Equipme Hand too Dando 30 R68 Comacch	s 00	Crew L	ogger	19 Oct 22 19 Oct 22 19 Oct 22 04 Nov 22	Depth 9.91 24.00	ole Dia. (mm) 200 120	Depth 9.00 12.00		Depth Related Remarks Ground Level 1 Coordinates E 4 National Grid N 4
proved																System
Date Time Casing Water		Sam		Donth	Field 1	Tests Records	Samp / Test	Depth	TCR % SCR % RQD	IT	Water added Flush details		Depth (Thickness	Level	Legend	d Strata Description
Casing water	0.10 0.10 - 0	D 1	o. Records	Depth	Туре	Records	Casing water	Diameter	%	(mm)	Flush details					Brown slightly silty fine and medium SAND. (TOPSOIL)
	0.20 0.50	ES 2 D 4	-										0.50	+1.40		0.50
	0.50 - 0 0.50	90 B 6 ES 5	-													Medium dense light brown gravelly very silty fine to coarse SAND with rare cobbles. (SUTTON SAND FORMATION)
	1.00 1.00	D7 ES8	-	1.20 - 1.65	SPTS	N=11 (1,1/2,2,3,4)	1.20 Dry					_	(1.40))		
	1.20	D 9		1.20 - 1.00		ID TH53 Er 75%	1.20 Diy						(1.40	·)		
													4.00	.0.00		
	2.00 2.20	D 10 D 11		2.20 - 2.65	SPT S	N=14 (2,3/4,3,3,4)	2.20 2.00						1.90	+0.00		Medium dense reddish brown mottled grey clayey fine SAND. (SUTTON SAND FORMATION) 2.20
	2.20 - 2			2.20 - 2.00	0110	ID TH53 Er 75%	2.20 2.00				Water added: 1.20 - 3.50	100 litres	(1.20))		
														-		
	3.00 3.20	D 13	-	3.20 - 3.65	SPT S	N=6 (4 1/4 1 2 2)	3.20 2.80						3.10	-1.20	 ◊ △ ٥	Firm to stiff, locally soft, reddish brown slightly sandy slightly gravelly silty
	3.20 3.20 - 3	D 15	-	3.20 - 3.65	3713	N=6 (1,1/1,1,2,2) ID TH53 Er 75%	3.20 2.60								× × 0 × 0 ×	CLAY. Gravel is subangular fine of siltstone. (MERCIA MUDSTONE, GRADE V)
															× × × × ×	<u>당역</u> - 전 일 역
	4.00	D 17													8 × × 0	
	4.20 - 4	65 UT 18	38 blows 100% rec				4.20 Dam	P							× × ×	
	4.70	D 19	-												× × 0 ×	
	5.00	D 20	-												× × × ×	
	5.20	D 21	-	5.20 - 5.65	SPT S	N=11 (1,1/2,3,2,4) ID TH53 Er 75%	5.20 Dam	р							× × · · ·	
															× × 0 - ×	
	6.00	D 22	-										(5.40))	×-0-X	
	6.20 - 6	65 UT 23	37 blows 100% rec				6.20 Dam	P							× × 0 × 0	
	6.70	D 24	_												8 0 X 0 C	6.70 Pockets of black fine sand.
	7.00	D 25	_												× × ×	
	7.20	D 26	-	7.20 - 7.65	SPTS	N=13 (1,3/3,2,3,5) ID TH53 Er 75%	7.20 Dam	р							× 0 × 0	
															×°×°-	7.50-8.50 With thin laminae of fine and medium sand.
	8.00	D 27	_												× × × ×	
	8.20 8.20 - 8	D 28	-	8.20 - 8.65	SPT S	N=17 (2,2/3,5,5,4) ID TH53 Er 75%	8.20 4.60								× × 0 ×	
													8.50	-6.60	××	Firm to very stiff reddish brown mottled bluish grey slightly gravelly CLAY. Gravel is angular to subangular fine and medium of grey weak sandstone.
8 Oct 22 1800 0.00 4.30	9.00	D 30														(MERCIA MUDSTONE, GRADE IVb)
9 Oct 22 0700 0.00 6.10	0		97 blows 89% rec				9.20 7.30						(1.4	1)		Thinly interlaminated MUDSTONE and SILTSTONE. Mudstone is extremely
10.0-1.00		5.00		0.70 0.04	CDT 0	E0 (45 40 5	0.70									weak to very weak reddish brown. Siltstone is very weak thickly laminated light bluish grey.
19 Oct 22 1800 9.20 7.80		D 32		9.70 - 9.91	SPT S	50 (15,10 for 50mm/41,9 for 10mm) ID TH53 Er 75%	9.70 7.95			i		ı	9.91	-8.01		Fractures are 0-10deg. very closely to closely spaced, planar and undulating, rough and smooth, with rare clay smearing. (MERCIA MUDSTONE, GRADE II) Hole continues on part sheet. 10.00-10.02 Soft bluish grey
						1.55							(0.16	5)		Hole continues on next sheet Clay infill on fracture surface.
Remarks																Boring / Chiselling Depths Duration (mins) Tool No. Depth Remarks 1 7.60 Rose to 4.10 m after 20 minutes. Medium inflow
															Status	us Borehole
nation of symbols	s and abbrev	ations see Key t	o Exploratory Hole Record given in brackets in depth	IS. All	oject oject No.	CROWLE FLO F2033-22	OOD ALLEVIATIO	N GI							Status	Scale 1:50
			aa Stackets in acpui		rried out fo		Vater									FINAL Printed 13 Jan 2023 15:54:38 © Copyright SOCOTEC UK Limited Sheet 1 of 3



-		Dept	th	Dates	I	Meth	od		Equipmen	Pia (Crew L	ogger	Loggod	ш	ole	Cas	na			Depth Related Remar	ve .			SOCOTEC
Chec	кеа	0.00 - 1	1.20 18 C	ct 22 - 18 Oct 22		and dug inspecti	ion pit to 1.2		Hand tools		Jiew L	Jogger	19 Oct 22	Depth	Dia. (mm)		Dia. (mm)	Depth	Remarks	Deptil Related Remai	no .	Ground Lev	vel	1.90 mOD
		1.20 - 9 9.91 - 2		ct 22 - 18 Oct 22 ct 22 - 21 Oct 22	Ca	able percussion I Rotary coring		91m.	Dando 3000 R68 Comacchio				19 Oct 22 04 Nov 22	9.91 24.00	200 120	9.00 12.00	200 120					Coordinate	s	E 476820.84
Appr						, ,								24.00	120	12.00	120					National Gr	rid	N 412723.53
Appro	oveu																							System OSGB
											TCR %						T							
	Date	Time		Samples			Field T	ests	Samp / Test	Coring Depth	SCR %	If	Water added		Depth	Level	Legend			Strata Descri	ption	o d	Water Entry	Backfill
10		Water	Depth	Type & No.	Records	Depth	Туре	Records	Casing Water) %	(mm)	Flush details		(Thickness	•				Main	Detai	ı	5	
9		0700 5.40											1		10.07	-8.17				and SILTSTONE. Mudston Siltstone is very weak thick				
																		light bluish gre		ly to closely spaced, planar	and undulating			
										9.91 - 11.20	98		Water flush:	100%				rough and smo	nooth, with rare clay s	smearing.	10.61-10.76 Firm v	erv gravelly		
										(108mm)	0	NI	9.91 - 11.20	rec					JDSTONE, GRADE II) ally weak, thinly laminated re	clay. Gravel is ang	ılar to		
11 —												70			(1.8	4)		locally calcare	eous MUDSTONE.		mudstone	coarse or		
-												130						and clean.	e U-10deg., extremely	closely to closely spaced p	10.87-11.12 Locally 11.04-11.46 NI rec			
											00							(MERCIA MUI	JDSTONE GRADE II))	angular to subangu			
-										11.20 - 12.0			Water flush:	20% rec							coarse gravel.			
	Oct 22	1800								(108mm)	18		11.20 - 12.00								11.69-11.76 NI rec			
12 —	2.00	3.60									-		1		11.91	-10.01				y laminated reddish brown	slightly gravel. 12.00-12.10 NI.			
	1 Oct 22 2.00	0700 3.40									99							calcareous MU Fractures are		paced, stepped and undula				
										12.00 - 12.7 (92mm)	0 64 56		Water flush: 12.00 - 12.70	100% rec				occasional cla	ay smearing (up to 2i JDSTONE, GRADE II	mm dia.).				
1 7										(9211111)	_ 36		12.00 - 12.70	160				(INIERCIA INIUL	DOTONE, GRADE II	1				
												NII.												
13 —												NI 200			(2.2	3)								
1 -												250												
1 -										12.70 - 14.2	98		Water flush:	100%										
1 3										(92mm)	42		12.70 - 14.20	rec							13.65 Vein of calcit	e (2mm		
1 3																					thick).	`		
14 —															,,,,	40.04					14.06-14.10 NI rec	overed as		
1 - 1	1 Oct 22	1800									110 i0 13		1	4000/	14.14	-12.24	×××××× ××××××			g reddish brown, thinly lami		lar fine to		
	2.00	3.10								14.20 - 14.5 (92mm)	0 13	NI 50	Water flush: 14.20 - 14.50	100% rec	(0.7	2)	×××××× ××××××	Fractures are	0-15deg. very close	y spaced beds of gypsum (ly to medium spaced undula	ating, rough with 14.24-14.40 NI rec			
	5 Oct 22 2.00	0700 2.20								, ,	86	280			(0	-,	×××××× ××××××	1mm infill of si	silt. JDSTONE, GRADE II)	angular to subangu gravel.	lar coarse		
'	2.00	2.20								14.50 - 15.2	0 54		Water flush:	100%	14.86	-12.96		<u> </u>		,	14.45-14.50 Bands			
15 —										(92mm)	43		14.50 - 15.20	rec						STONE and SILTSTONE w 30mm thick). Mudstone is	extremely weak subangular mediur			
																		to very weak, t	, thinly laminated red	dish brown. Śiltstone is wea				
1 4																			very closely to medi	um spaced undulating and	stepped with 14.98-15.09 Gypsu			
1 1												NI			(4.7	7)		frequent clay i	infill (up to 15mm). JDSTONE, GRADE II)	recovered as angu subangular mediur			
1 1										15.20 - 16.7	98	90 202	Water fluids	1000/	(1.7	")		(MERON TIMOS	DOTOINE, OFFIDE II	,	gravel of gypsum.			
16 —										(92mm)	0 64 18		Water flush: 15.20 - 16.70	100% rec							15.24-15.27 Greyis gypsum.	h white		
1 1																					15.38-15.40 NI rec angular to subangu			
1 1																					siltstone gravel.			
											<u> </u>		1		16.63	-14.73	××××××			laminated to thinly bedded		h white		
												15					×××××× ××××××	SILTSTONE w dia.).	with occasional beds	of medium spaced gypsum	(up to 70mm 15.70-15.73 Veins	of gypsum		
17 —												50			(0.9	1)	××××××	Fractures are	0-10deg. extremely	closely to closely spaced, p				
										16.70 - 18.0	96 0 51	80	Water flush:	100%			×××××× ××××××	staining on fra	acture surfaces.	clay smearing and rare oran	gish brown with lithorelicts (up dia.).	to 22mm		
1 -										(92mm)	0		16.70 - 18.00	rec	17.54	-15.64	$\times \times \times \times \times \times$	(MERCIA MUI	JDSTONE, GRADE II		15.92-15.95 Recov			
]_	5 Oct 22	1900													(0.5			weak mudston	ne (up to 25mm dia.)	avelly CLAY with lithorelicts interbedded with rare band		liar medium of mudstone		
	5 Oct 22 2.00	1800 2.40																and widely spa	pacèd bluish grey silfs JDSTONE, GRADE II	stone.	in a silty clay matri 16.12-16.14 Branc	ζ.		
		0700											1		18.04	-16.14	××××××	Weak to medio	lium strong thinly lam	inated to thinly bedded bluis	sh grey gypsum (up to 4mr	n thick).		
]11	2.00	1.70															×××××× ××××××			asional beds of extremely w are bands of gypsum.	avpsum.			
-											400						×××××× ××××××	Fractures are	0-10deg. extremely	closely to medium spaced,	planar and 17.04-17.07 Greyis	h white		
										18.00 - 19.5			Water flush:	100%			×××××××	(MERCIA MUI	mooth and rough with JDSTONE, GRADE II	n frequent smearing on fract)	ture surfaces. gypsum. 17.18 Clay infill (up	to 2mm		
19 —										(92mm)	57	NI 150	18.00 - 19.50	rec			×××××× ××××××				thick). 17.68-17.70 Greyis			
"												280		1			×××××× ××××××	\{			gypsum.			
														1			×××××× ××××××				17.70-17.73 Siltsto 17.91-17.92 Greyis			
														1	(3.0	9)	×××××× ××××××				gypsum.			
														1		•	×××××× ××××××				17.93-17.95 Siltsto 18.18-18.19 Greyis			
20 —														I			××××××		11-1-	ntinues on next sheet	gypsum. 18.21-18.23 NI.			
																			Hole Col	THILLIAGS OF TICKL SHEEL	10.21-10.20141.			
General F	Remarks			1 1		ı			1				I					oring / Chiselling		. .	Groundwater Entries			
																	'	Depths Du	Ouration (mins)	Tool	No. Depth Remarks			Sealed
Notes						Τ											Status	;		<u> </u>	Borehole			
For explai	nation of sy	mbols ar	nd abbreviati	ns see Key to Exp	ploratory Hole Records	s. All	oject		LOOD ALLEVIATION	GI										Scale 1:50			1164 11	,
depths an	d reduced	levels in	metres. Strat	um thickness giver	n in brackets in depth	column. Pro	oject No.	F2033-22										FINA	AL.	Printed 13 Jan 2023	15:54:38 AGS	В	H01-W	<i>!</i>
L						Cai	rried out fo	r Severn Trent	vvater			_								© Copyright SOCOTE	C UK Limited AGS		Sheet 2 of 3	



С	hecked	Dep	th	Dates		Method	i	Equipment	Rig Cr	ew Log	gger	Logged	Но	ole	Casi	ng		Depth Related Remarks			
		0.00 -		3 Oct 22 - 18 Oct 22		g inspection	pit to 1.20m.	Hand tools				19 Oct 22		Dia. (mm)		Dia. (mm)	Depth	Remarks		Ground Level	1.90 mOD
		1.20 -	9.91 1	3 Oct 22 - 18 Oct 22 Oct 22 - 21 Oct 22	Cable per	ercussion bor ary coring to	ring to 9.91m.	Dando 3000 R68 Comacchio				19 Oct 22 04 Nov 22	9.91 24.00	200 120	9.00	200	1			Coordinates	E 476820.84
		J 3.31 - 2	24.00	0 00122 - 21 00122	Tiole	ary corning to	24.00111.	1100 Corriaccino	403			04 1407 22	24.00	120	12.00	120	l			National Grid	N 412723.53
A	proved																l				System OSGB
_																	1				System 030b
																	1				
		'						+ -	T. '	TCP %								<u>-</u>			
	Date	Time		Samples	•		Field Tests	Samp / Test	Coring Depth	TCR % SCR %	If W	ater added		Depth	Level	Legend		Strata Description		चुं Water	Backfill
	Casing	Water	Depth	Type & No.	Records D	Depth	Type Records	Casing Water	(Diameter)	RQD % (I	mm) FI	lush details		(Thickness)			Main	Detail	흥 Entry	
20 -										ΤĨΤÌ						×××××	Weak to medi	um strong thinly laminated to thinly bedded bluish grey nterbedded with occasional beds of extremely weak to weak	18.40-18.46 Recovere	ed as	
									19.50 - 21.00		V	Nater flush:	100%			××××× ××××××	SILTSTONE ir	nterbedded with occasional beds of extremely weak to weak	angular to subangular	fine to	
	-								(92mm)	89	19	9.50 - 21.00	rec			×××××× ××××××	Fractures are	MUDSTONE and rare bands of gypsum.	coarse mudstone. 18.50-18.53 Greyish v	vhite	
-	1								1	69 33						××××××	undulating, sm	0-10deg. extremely closely to medium spaced, planar and nooth and rough with frequent smearing on fracture surfaces.	gypsum.		
									1	``						×××××× ××××××	(MERCIA MUI	DSTONE, GRADE II)	18.80-18.93 Greyish v gypsum.	vhite	
21 -	}								1							××××× ××××××			19.37-19.39 1nr subve	ertical	
21	-								1	I ⊢				21.13	-19.23		Vanguyaak ta y	weak, locally extremely weak, dark reddish brown, mottled	fracture dipping (appro	ox.	
									1								black, thinly la	minated MUDSTONE, interlaminated with weak to strong thinly	80deg.) stepped and r 19.50-19.55 AZCL.	ougn.	
-	1								1								to thickly lamir	nated brownish grey SILTSTONE and frequent bands of	19.81-19.88 Greyish v	vhite	
	1									97	NI .		4000/				gypsum (15mi Fractures are	m dia.). 0-10deg. very closely to medium spaced, undulating, stepped,	gypsum. 20.34-20.37 Firm to st	tiff dark	
	_								21.00 - 22.50 (92mm)	63 38	NI 100 220	Nater flush: 1.00 - 22.50	100% rec	(1.3	7)		rough with sor	me clay smearing.	reddish brown very gra		
22 -	-								(`` '	220						(MERCIA MUI	DSTONE, GRADE II)	Gravel are lithorelicts		
	-								1										extremely weak muds 25mm).	torie (up to	
	1								1										20.54-20.61 Greyish v	vhite	
-									1					22.50	-20.60		AZCL.		gypsum. 20.83-20.86 Greyish v	vhite	
									1					(0.50	0)				gypsum.		
00									1					23.00	-21.10				20.91-20.97 Greyish v gypsum.	vhite	
23 -	-								1	67	NII			23.00	-21.10			weak thinly laminated dark reddish brown MUDSTONE	21.15-21.16 Greyish v	vhite	
	1								22.50 - 24.00	21	INI	Nater flush:	100%	(0.59	9)			angular coarse gravel and cobbles (up to 90mm dia.). DSTONE, GRADE II)	gypsum. 21.23-21.26 Greyish v		
-									(92mm)	8	NI 2	2.50 - 24.00	rec				(gypsum.	vnite	
	1								1	1 F	60			23.59	-21.69	××××× ××××××	Very weak to r	medium strong thinly to thickly laminated bluish grey, mottled	21.30-21.32 Greyish v	vhite	
	26 Oct 22								1		100			(0.4		×××××	reddish brown	SILTSTONE.	gypsum. 21.63 Vein of gypsum	(approx	
24 -	12.00	3.90							1		150		l	24.00	-22.10	×××××	rare orangish	(0-20deg.) closely spaced, undulating and stepped, rough with brown staining on surface.	2mm thick).		24.00
	1								1								(MERCIA MUI	DSTONE, GRADE II) END OF EXPLORATORY HOLE	22.27-22.30 NI recover angular to subangular		
									1									END OF EXPLORATORY HOLE	coarse mudstone grav		
-	1								1										_		
	-								1												
05	-								1												
25 -									1												
									1												
-	1								1												
	1								1												
	-								1												
26 -									1												
	1								1												
	1								1												
-									1												
	_								1												
27 -									1												
21									1												
	1								1												
-	1	- 1							1												
	1	- 1							1												
	1	- 1							1												
28 -	1	- 1							1												
	-	- 1							1												
		- 1							1												
] -	1	- 1							1												
	1	- 1							1												
29 —	1	- 1							1												
Z9 -	-	- 1							1												
	1	- 1							1												
-	1	- 1							1												
	1	- 1							1												
	1	- 1							1												
30 -	1	- 1																			
L									<u></u>							<u> </u>					
Gener	al Remarks				l		ı	•	-								oring / Chiselling	Groundwater Entri		ı	<u> </u>
																D	Depths Du	uration (mins) Tool No. Depth R	emarks		Sealed
																1					
																1					
L																					
Notes						D!	opt Opour F F	OOD ALLEVIATION	CI							Status		Cools 4.FO	Borehole		
For ex	planation of	symbols a	nd abbrev	ations see Key to Ex	oploratory Hole Records. All	Proje		OOD ALLEVIATION	GI							1	F11.14	Scale 1:50		DUA V	, l
depths	and reduce	ed levels in	metres. S	tratum thickness give	en in brackets in depth column		ect No. F2033-22									1	FINA	Printed 13 Jan 2023 15:54:38	■T AGS	BH01-V	v
						Carrie	ed out for Severn Tren	Water										© Copyright SOCOTEC UK Limited	AGS	Sheet 3 of 3	



Checked	l D	epth	Dates		Meth	od		Equipment	t ∣ Rig C	rew L	.ogger	Logged	I H	ole	Casi	ing		Depth Related Remarks				soco.
	0.00	- 1.20 30 Se	ep 22 - 30 Sep 22 ep 22 - 30 Sep 22		Hand dug inspecti Cable percussion b			Hand tools Dando 3000				30 Sep 22 30 Sep 22	Depth 4.50	Dia. (mm) 150	Depth 4.50	Dia. (mm) 150	Depth	Remarks	Ground Lev		_	2.88 m
			oct 22 - 04 Oct 22		Rotary coring			R67 Comacchic				12 Oct 22	20.00	120	4.65	120			Coordinate			E 47859
proved	1																		National Gr	ria	System	N 4116
												•									2,010	
Date	Time		Samples			Field T	Tests	Samp / Test	Coring	TCR % SCR %		Water added		Depth	Level	Legend		Strata Description		<u></u> ₩ater	Bac	ackfill
Casing	Water	Depth	Type & No.	Records	Depth	Туре	Records	Casing Water	Depth (Diameter)	RQD	If (mm)	Flush details		(Thickness				Main Deta	ı g	Entry		_
		0.20	ES 1											(0.30		公	MACADAM.					
-		0.40	ES 2											0.30	+2.58		Dark brown g	gravelly clayey fine and medium SAND with occasional cobbles. gular to subrounded fine to coarse of sandstone, mudstone, 0.50 Whole brick y	:4h h			
7														0.70)) +2.18		macadam an	nd brick. Cobbles are subrounded of sandstone. edges.				
3		0.80	ES 3											0.70	+2.10	××××	(FILL)	dium dense orangish brown gravelly silty fine and medium 0.70-0.90 Sand is possible contamin	rey with			
}		1.00	ES 4													××^.	SAND.	from made ground				
-		1.20	D 5		1.20 - 1.65	SPT S	N=9 (1,1/2,2,2,3) ID TH66 Er 65%	1.20 Damp								×××××	(SULTON SA	AND FORMATION)				
							ID 1H00 Er 05%									×·×·×·						
_														(0.4)		×·×·×		1.70-2.80 Becomi	a arevish			
		1.80 - 2.00	B 6											(2.10	J)	$\hat{\mathbf{x}}$		brown sand.	, 9 ,			
		2.00	D 7		2.00 - 2.45	SPT S	N=11 (2,3/3,3,4,1) ID TH66 Er 65%	2.00 Damp								$\overset{\times}{\times}\overset{\wedge}{\times}\overset{\wedge}{\times}$				1 🛂		
							15 11100 21 00%									××××						
1																î××××						
-		l														××××××						
1		2.80 - 3.00	B 8		200 2:-	007.0	N-47 (0.0/0 : : : :	2.00 -						2.80	+0.08			recovered as soft to firm (due to water added) dark brown sandy				
		3.00 3.00 - 3.45	D 10 D 9		3.00 - 3.45	SPT S	N=17 (2,3/3,4,4,6) ID TH66 Er 65%	3.00 Damp									CLAY. (Possible ME	ERCIA MUDSTONE, GRADE IVb)				
1														(4.00	. \		Very stiff dark	k orangish brown gravelly CLAY with lithorelicts of extremely				
														(1.20))			h blue laminated mudstone. UDSTONE, GRADE III)				
}		3.80 - 4.00	B 11														(IVILITOIA IVIO	SECTIONE, GIVIDE III)				
}		4.00 - 4.45	D 12		4.00 - 4.43	SDT S	50 (3,3/6,11,18,15 for	4.00 Damp						4.00	-1.12		Extremely we	eak to very weak thinly laminated to very thinly bedded greenish		1 💂		
		4.00 - 4.45	D 12		4.00 - 4.43	3513	50mm)	4.00 Danip						4.00	-1.12		grey MUDST	TONE with very closely spaced very thin beds of gypsum.				
30 Sep 22							ID TH66 Er 65%							(0.0)	-\			e 0-10deg. extremely closely to closely spaced, planar, stepped, mooth, locally loss of wall strength penetrating up to 10mm,				
4.00 04 Oct 22	2.10	-											T.	(0.85	o)		generally clay	IDOTONE ODADE II)				
4.80	2.00									91							<u> </u>	4.05-4.05 Becomin	រូ greenish			
									4.50 - 5.30 (92mm)	22 0		Water flush:	98% rec	4.85	-1.97			aminated to very thinly interbedded MUDSTONE and 4.80-4.85 Greenis				
									(92111111)	"	NI	4.50 - 5.30					very thinly be	edded, greenish grey. Siltstone is weak thickly laminated to very				
1									500 500	43	40		000/	(0.98	3)		Fractures are	d light greenish grey. e 0-10deg. extremely closely to closely spaced, planar and clay with occasion				
_					5.60 - 5.76	SPT S	50 (4,21 for 65mm/50	4.80 2.00	5.30 - 5.60 (92mm)	43 0	70	Water flush: 5.30 - 5.60	98% rec					smooth, predominantly clean, locally up to 12mm of soft clay.	ne.			
1							for 15mm)							5.83	-2.95			udstonally disturbed. 5.20-5.28 Very we 5.60-5.77 NI recov				
							ID TH70 Er 66%				NII			3.03	-2.33		Thinly interlar	reddish brown slig	ntly clayey			
1										96	100			(0.67	7)			weak thinly laminated reddish brown. Siltstone is weak thinly to coarse gravel of m	udstone and			
1									5.60 - 7.10	81	125	Water flush:	98% rec	1			Fractures are	e 0-40deg. extremely closely to closely spaced, planar to gypsum.				
										32	7	5.60 - 7.10		6.50	-3.62			inour to rough, min mill of sandy angular line and medium				
1											60			(0.57	7)			UDSTONE, GRADE II) Gracture infilled with	quartz and			
1											130			7.07	-4.19		Weak to stror	ong grey becoming reddish brown, very thinly to thinly bedded gypsum (up to 20r 7.02-7.05 Gypsum				
					7.10 - 7.22	SPTS	50 (25,0 for 40mm/50 for 5mm)	4.80 2.20			50			7.07	-4.19	×××××× ××××××	SILTSTONE.					
							ID TH70 Er 66%				55 115			(0.57	7)	×××××× ××××××	locally infilled	d with <1mm angular fine gravel, locally infilled with up to 20mm				
											115			7.64	-4.76	×××××× ××××××	of soft clay. (MERCIA MU	UDSTONE, GRADE II) 7.64-7.69 Gypsun				
1									7.10 - 8.60	100 87		Water flush:	98% rec				\					
-									(92mm)	36		7.10 - 8.60						aminated to thinly interbedded MUDSTONE and SILTSTONE with ery thin to thin beds of gypsum. Mudstone is extremely weak to 8.03-8.07 Thinly la	ninated.			
																		ng thinly laminated to thinly bedded greenish grey. Siltstone is fium strong thinly laminated to very thinly bedded light grey.				
_																	Fractures are	e 0-10deg. extremely closely to medium spaced, planar, rough, 8,43-8,51 Gypsum				
-											NI 100			(2.13	8)			d with up to 15mm of soft clay. UDSTONE, GRADE II)				
_											235			(2.10	2)		· ·	aminated to very thinly interbedded SILTSTONE and MUDSTONE				
																	with occasion	nal gypsum clasts and beds. Siltstone is very weak to weak thinly				
-									0.00 40.40	100 85		\A/=4== #\=	000/					very thinly bedded grey. Mudstone is extremely weak to very to thickly laminated reddish brown. Bedding is occasionally wavy 9.26-9.30 Gypsun				
1									8.60 - 10.10 (92mm)	13		Water flush: 8.60 - 10.10	98% rec				and disturbed	d. 9.38-9.74 Thinly to	thickly			
																	rough, locally	y infilled up to 25mm with soft very gravelly clay.				
														9.77	-6.89	×××××× ××××××	(MERCIA MU	UDSTONE, GRADE II) 9.85-10.10 Gypsu				
		İ							İ				•			XXXXXX		Hole continues on next sheet 40mm).				
al Remarks	•	<u> </u>							<u> </u>							Hard B	oring / Chiselling	g Groundwater Entries				
ai iveniai KS	-																	Duration (mins) Tool No. Depth Remarks 1 4.00 Rose to 2.10 m after	.0 minutes.			
					Pro	oject	CROWLE FLO	OD ALLEVIATION	GI							Status		Scale 1:50				
				oloratory Hole Record in brackets in depth	ds. All	ject No.	F2033-22										FINA	I I	F	3H02-E	Ē	
and reduce	eu ieveis																••				_	



				Datas	T	Mati	bod		Eavinmen	Bia C		Lannar	Lammad	ш	ala l	Coo	in.e		Don'th Polated Remarks	Γ	SOCOTE
Checke			1.20 30 Se	Dates p 22 - 30 Sep 22		Met Hand dug inspec	tion pit to 1.		Equipment Hand tools		rew	Logger	30 Sep 22	Depth	ole Dia. (mm)		Dia. (mm)	Depth	Depth Related Remarks Remarks	Ground Level	2.88 mOE
				p 22 - 30 Sep 22 ct 22 - 04 Oct 22		Cable percussion Rotary coring			Dando 3000 R67 Comacchio				30 Sep 22 12 Oct 22	4.50 20.00	150 120	4.50 4.65	150 120			Coordinates	E 478599.05
Approve	d																			National Grid	N 411665.68
																					System OSGB
Dat	e T	ime		Samples			Field	Tests	Samp / Test	Coring	TCR % SCR %		Water added		Depth	Level	Legend		Strata Description	चूं Water	Backfill
10 Casi	ng V	/ater	Depth	Type & No.	Records	Depth	Туре	Records	Casing Water	Depth (Diameter)	RQD %	(mm)	Flush details		(Thickness	·)			Main Detail	ig Entry	
10 -												NI			(0.7	9)	×××××× ××××××		aminated to very thinly interbedded SILTSTONE and MUDSTONE nal gypsum clasts and beds. Siltstone is very weak to weak thinly		
1												30 55					×××××× ××××××	laminated to	very thinly bedded grey. Mudstone is extremely weak to very to thickly laminated reddish brown. Bedding is occasionally wavy		
7													1		10.56	-7.68		and disturbed	rd. 10.61-10.67 Gypsum.		
]										10.10 - 11.60		l	Water flush:	98% rec				rough, locally	e 0-10deg. extremely closely to very closely spaced undulating, y infilled up to 25mm with soft very gravelly clay.		
11 —										(92mm)	23	NI 50	10.10 - 11.60		(1.0-	1)		<u> </u>	UDSTONE, GRADE II)		
]												95							o weak thinly laminated to very thinly bedded, greenish grey iddish brown MUDSTONE with occasional thin laminae to very		
															11.60	-8.72			weak light grey and greenish grey siltstone. 11.50-11.60 Weak gyl e 0-10deg. very closely to closely spaced, planar, rough and	sum.	
-												NI						smooth, local	ally infilled with up to 18mm of soft gravelly clay. Locally loss of a penetrating up to 10mm.		
12 —												30 40			(0.6	7)			UDSTONE, GRADE II)		
]											99		<u> </u>		12.27	-9.39			kly interlaminated MUDSTONE and SILTSTONE. Mudstone is 12.10-12.11 Gypsum. 12.19-12.27 Soft very		
										11.60 - 13.10 (92mm)	70 23		Water flush: 11.60 - 13.10	98% rec					eak to very weak thinly to thickly laminated reddish brown. clay. Gravel is angula subangular fine and n		
=																			e 0-10deg. extremely closely to very closely spaced, planar to smooth and rough, frequently infilled with up to 35mm of angular lithorelicts.	tone	
		1700																	ar fine to coarse gravel, locally infilled with up to 40mm of soft		
13 — 4.80 - 05 O		3.00 0500										1							UDSTONE, GRADE II) 13.21-13.25 NI recove	ered as	
4.65		2.10																	eak to medium strong thinly laminated to very thinly bedded, slightly clayey subang subrounded fine to co	ular to	
-											100	NI 90			(2.7	3)		and occasion	nal weak thin laminae to very thin beds of light grey and greenish gravel of gypsum and		
=										13.10 - 14.60	85	120	Water flush:	100%					e 0-10deg. extremely closely to closely spaced, rough, 13.30-13.39 Weak to	medium	
14 —										(92mm)	21		13.10 - 14.60	rec					oredominantly clay or silt smeared, locally up to 15mm of soft strong gypsum. 1. Locally wavy and disturbed bedding. Locally loss of wall strong gypsum. 14.00-14.15 Gypsum	clasts and	
]																			letrating up to 40mm. lenses (up to 15mm). UDSTONE, GRADE II) 14.18-14.27 Gypsum.		
-												4						(14.65-14.67 Gypsum.		
=																			14.85-14.95 NI recovi	ered as	
15 —													1		15.05	-12.17		Thinly to thic	slightly clayey angula skly interlaminated MUDSTONE and SILTSTONE with occasional subrounded fine to co	to	
=										14.60 - 16.10	100		Water flush:	100%				thin laminae	to thin beds of gypsum. gravel.		
_										(92mm)	0		14.60 - 16.10	rec				bedded, redd	extremely weak to very weak, thinly laminated to very thinly dish brown and greenish grey. Siltstone is extremely weak to 15.55-15.56 Gypsum.	osum.	
]																			to thickly laminated greenish grey and grey. e 0-10deg. extremely closely to closely spaced, planar,		
16																		undulating, s	smooth and rough, predominantly silt smeared, locally infilled with of soft gravelly clay. Bedding is occasionally wavy and disturbed.		
												NI 60			(2.3	3)		(MERCIA MU	UDSTONE, GRADE II) 16.10-16.13 NI recover angular to subangular		
-												110			,	,			coarse gravel of gyps mudstone.		
-											100								16.40-16.41 Gypsum.		
=										16.10 - 17.60	79		Water flush:	100%							
17 —										(92mm)	28		16.10 - 17.60	rec					47.00.47.24.0:		
]													1		17.38	-14.50	V V V · · · · ·	1/	17.20-17.31 Gypsum.		
4												NI					××××××	brown SILTS	o medium strong thinly to thickly laminated light grey and pinkish BTONE with occasional thin laminae to very thin beds of gypsum 17.56-17.58 Gypsum.		
‡												40 80			(0.7)	6)	× × × × × × × × × × × × × × × × × × ×	Fractures are	n to thick laminae of mudstone. 17.64-17.66 Gypsum. e 0-10deg. extremely closely to closely spaced, undulating, 17.75-17.78 Gypsum.		
18												00			10.44	45.00	× × × × × × × × × × × × × × × × × × ×	planar and st	tepped, rough, predominately silt smeared. 17.83-17.86 Gypsum. UDSTONE, GRADE II) 18.08-18.12 NI recove	ered as	
‡										17.60 - 19.10	100		Water flush:	100%	18.14	-15.26	×××××× ××××××	\	slightly clayey angula y strong thinly laminated to very thinly bedded, dark and light grey	to	
4										(92mm)	0		17.60 - 19.10	rec			××××× ××××××	SILTSTONE	with frequent thin laminate to thin beds of gypsum. e 0-10deg, extremely closely to closely spaced, planar, stepped gravel. 18.16-18.25 Gypsum.		
]																	××××× ××××××	and undulatir	ing, smooth and rough, clean and silt smeared. 18.44-18.46 Gypsum.		
19 —												2				2)	× × × × × × × × × × × × × × × × × × ×	(MERCIA MU	18.71-18.76 Gypsum.		
‡												80 110			(1.8	9)	× × × × × × × × × × × × × × × × × × ×		18.83-18.85 Gypsum. 19.02-19.04 Weak to	strong	
]											92						×××××× ××××××		gypsum. 19.40-20.00 Bedding		
-										19.10 - 20.00 (92mm)	92		Water flush: 19.10 - 20.00	100% rec			× × × × × × × × × × × × × × × × × × ×		occasionally wavy. 19.64-19.74 Weak gy		
4 65		1700 2.40													00.00		×××××× ××××××			Jouiti.	
20]	•	20.00	-17.12	XXXXX		END OF EXPLORATORY HOLE		
General Ren	arks							ı	ı				I		I .			oring / Chiselling			
																		Depths C	Duration (mins) Tool No. Depth Remarks		Seale
Note -																	04.1				
Notes For explanati	on of svm	nbols an	nd abbreviation	ons see Kev to Fy	ploratory Hole Record	ds. All Pr	roject	CROWLE FL	OOD ALLEVIATION	GI							Status		Scale 1:50		_
					n in brackets in depth	h column. Pr	roject No.	F2033-22										FINA	AL Printed 13 Jan 2023 15:54:39	BH02-E	=
						Ca	arried out f	for Severn Trent	t Water										© Copyright SOCOTEC UK Limited	Sheet 2 of 2	

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					1							<u> </u>										SOCOTEC
Checke	0.0	Depth 00 - 1.20 20 - 6.00	12 Oct	Dates 22 - 12 Oct 22 22 - 12 Oct 22	2 Ha	Mether and dug inspection (windowless)	on pit to 1.2	20m.	Equipmen Hand tools Dart 534		Crew Logger	12 Oct 22 12 Oct 22	Depth	Dia. (mm)		Dia. (mm)	Depth Remarks	Depth Related Remarks		Ground Level		1.58 mOD
	1.4	20 - 0.00	12 000	. 22 - 12 OCI 22	Dynan	iic (wiildowiess)	sampling t	to 6.00m.	Dail 554			12 OCt 22	4.00 5.00 6.00	113 101 84	4.00	113				Coordinates National Grid		E 477031.18 N 412434.10
Approve	d												0.00	04						National Ond		System OSGB
Dat	e Tim	ie		Sample	es		Field 1	Tests	Samp / Test	Coring Depth	TCR % SCR % RQD	Water added		Depth	Level	Legend		Strata Description			Water Entry	Backfill
0 Casi	ng Wat	ter I	Depth	Type & No.	Records	Depth	Туре	Records	Casing Water	(Diameter)	% %	Flush details		(Thickness	s)		Dark brown sandy gravelly claye	Main y SILT. Gravel is subangular to subrounded	Detail	ნ	Liluy	
			0.30	ES 1	-									(0.6	0)		fine and medium of mudstone, br (MADE GROUND)	y SILT. Gravel is subangular to subrounded rick and quartz.				
-														0.60	+0.98		Soft black sandy silty CLAY.					
1 -			0.80	ES 2	-									1.00	0) +0.58		(Possible MADÉ GROUND)	ense dark greyish orange fine and medium				
=		1.2	1.20 20 - 2.00	D3 L	100% rec, dia 87mm	1.20 - 1.65	SPT S	N=1 (0,0/0,0,0,1) ID Dart 534 Er 70%	1.00 Dry								SAND. (SUTTON SAND FORMATION)	nise dan greyish olange illie and medium			1 🔀	
-			1.40	D 4	<u>.</u>														4.70.4.00.1/		1 🗷	
			1.75 2.00	D 5	-	2.00 - 2.45	SPT S	N-42 (4 0/0 2 2 5)	200 400					(2.0	2)				1.70-1.80 Very clayey 1.80-3.00 Becoming b	rown.		
2 —		2.0	00 - 3.00	D 6 L	100% rec, dia 87mm	2.00 - 2.45	3713	N=13 (1,2/2,3,3,5) ID Dart 534 Er 70%	2.00 1.29					(2.0	0)							
-			2.50	D 7	-																	
-																						
3 —		3.0	3.00 00 - 4.00	D8 L	100% rec, dia 87mm	3.00 - 3.45	SPT S	N=11 (1,2/2,3,2,4) ID Dart 534 Er 70%	3.00 1.28					3.00	-1.42		Firm to stiff dark brown CLAY. (Probable MERCIA MUDSTONE))				
-			3.40	D 9	-													•	3.50-3.55 Sandy clay.			
- - -																			3.80-3.84 Verv clavev			
4 —			4.00 00 - 5.00	D 10 L	85% rec, dia 77mm	4.00 - 4.45	SPT S	N=9 (2,2/2,2,2,3) ID Dart 534 Er 70%	4.00 1.24										Material very wet.			
- - -				D 44	·									(2.0	2)							
-			4.50	D 11	-									(3.0	u)							
5 —			5.00	D 12		5.00 - 5.45	SPT S	N=10 (2,2/2,2,3,3)	4.00 1.32										5.00-5.20 Very sandy Material very wet.	clay.		
-			00 - 6.00 5.10	L D 13	80% rec, dia 67mm			ID Dart 534 Er 70%											Material very wet.			
-			5.50	D 14	-																	
6 —			6.00	D 15	_	6.00 - 6.45	SPT S	N=20 (4.4/4.5.5.6)	4.00 1.08					6.00	-4.42		END OF	EXPLORATORY HOLE				6.00
=								N=20 (4,4/4,5,5,6) ID Dart 534 Er 70%									END OF	EXI EGIVLONI NOLE				
-																						
7 —																						
, <u> </u>																						
=																						
=																						
8 —																						
- - -																						
9 —																						
]																						
-																						
10																						
General Ren	narks																oring / Chiselling	Groundwater Er	tries			
	-																Depths Duration (mins)	Tool No. Depth 1 1.58	Remarks Rose to 1.29 m after 20 r	ninutes. Seepage		Sealed
Notes						5	ioot	ODOMA E EL C		CI						Status	·	Scolo 1:50	Borehole			
For explanati depths and re	on of symbo educed leve	ols and a els in met	bbreviation res. Stratur	s see Key to E n thickness giv	exploratory Hole Records wen in brackets in depth of	s. All column. Pro	ject ject No.	F2033-22	OOD ALLEVIATION	- GI							FINAL	Scale 1:50 Printed 23 Jan 2023 17:02:14		WS	801-W	
						Car	ried out fo	Severn Trent V	Water									© Copyright SOCOTEC UK Limited	■T AGS		eet 1 of 1	



CI	ecked	Dep	oth	Dates		Meth	od		Equipmen	t Rig C	rew Lo	gger Logged		lole	Casi	ing		Depth Related Remarks		Γ		SOCOTEC
_		0.00 -	1.20 04 Oc	t 22 - 04 Oct 22 t 22 - 04 Oct 22	2 Ha 2 Dvnam	and dug inspecti nic (windowless)	on pit to 1.2	20m. to 5.00m.	Hand tools Dart 534			04 Oct 22		Dia. (mm)		Dia. (mm) 113	Depth Remarks			Ground Lev		2.03 mOD
					,	,	1 3						4.00 5.00	101 84	3.00	110				Coordinates National Gri		E 477003.16 N 412635.84
Ap	proved												3.00	04						- Hational On	u	System OSGB
	Date	Time		Sample	es .		Field 1	Tests	Samp / Test	Coring	TCR %	Water added						Strata Description			Water	
		Water	Depth	Type & No.	Records	Depth	Туре	Records	Casing Water	Depth	SCR % RQD %	Flush detail		Depth (Thickness	Level	Legend		Main	Detail	Chise	Water Entry	Backfill
0 —	Guomig	Water	Борин	lype a ne.	Records	Борат	1,700	Trederide	Cubing Water	(Diameter)	76	T tuon uctum		(**************************************	-,		Dark brown slightly grave	elly sandy SILT with frequent roots (<8mm dia.).	Dottaii			Flush cover
			0.30	ES 1	-												and clay pipe.	subrounded fine and medium of sandstone, plastic	0.30 Small plastic con	nb.		
-			0.40 0.50 - 0.80	D 2 B 3	_									(1.0	0)		(MADE GROUND)		0.40-0.90 4nr fragmer broken clay pipe (up to	o 50mm x		0.50
																			60mm).			
1 -			1.10	ES 4										1.00	+1.03		Very soft to soft dark bro	own sandy CLAY.	_			
:			1.20 1.20 - 2.00	D 5 L	100% rec, dia 87mm	1.20 - 1.65	SPT S	SW=450 ID Dart 534 Er 70%	0.00 Dry					(0.5	0)		(Possible MADE GROUN	ND)	1.20-1.50 Organic ma probably small seeds			
-			1.60	D 6	_									1.50	+0.53			grey slightly sandy silty CLAY. Slight organic odour.	_			
			1.80	D 7	_									1.70 (0.3	+0.33		(Possible MADE GROUN	,	1.90-1.95 Organic odd	our and	1.7	
2 -			2.00 2.00 - 3.00	D8 L	100% rec, dia 87mm	2.00 - 2.45	SPT S	N=8 (2,1/1,2,2,3) ID Dart 534 Er 70%	2.00 Dry					2.00 (0.1	+0.03		Dark brownish grey sligh (Possible MADE GROUN	ntly clayey fine and medium SAND. ND)	small pieces of wood.	our and	1 🚾	2.10
			2.05 2.20	D 9 D 10	100 % 100, ala 0711111			15 Bart 604 E1 7070						2.10	0, 0.07		Soft grey sandy CLAY w	ith occasional wood fragments.	1			
-														(0.7	(5)		(Possible MADE GROUN	ND)				
			2.70 2.90	D 11 D 12	-									2.85	-0.82		mottled black clay and p	SAND with pockets of soft to firm greyish brown ockets of organic material (possible bark). Slight				
3 —			3.00 3.00 - 4.00	D 12 D 13 L	100% rec, dia 77mm	3.00 - 3.45	SPT S	N=7 (2,3/2,2,1,2) ID Dart 534 Er 70%	3.00 1.87								organic odour. (Possible MADE GROU!	ND)	/			
			3.40	D 14	100% rec, dia 77mm			ID Balt 354 El 7076						(0.8	5)		Loose brown silty fine an (Possible MADE GROUN	nd medium SAND. Slight organic odour.				
-			3.40	D 14																		
:			3.80	D 15	-									3.70 (0.3	-1.67 (0)	<u>×</u> ×	Firm to stiff dark brown s (Possible MERCIA MUD	slightly sandy silty CLAY.				3.70 SP
4 —			4.00 4.00 - 5.00	D 16 L	100% rec, dia 67mm	4.00 - 4.45	SPT S	N=9 (1,1/2,2,2,3) ID Dart 534 Er 70%	3.00 1.87					4.00	-1.97	^— —> 	Loose dark brown fine a	nd medium SAND with pockets of soft brown clay.				4.00
:			4.20	D 17	100 % 100, ala 0711111			IB Built out El 10%						(0.6	(0)		(Possible MERCIA MUD	STONE)				
-														4.60	-2.57		0.61.5	L THE OLD W				
:			4.80	D 18	-									(0.4		<u> </u>	Soft to firm dark brown s (Possible MERCIA MUD	sandy sitty CLAY. STONE)				
5 —			5.00	D 19	-	5.00 - 5.45	SPT S	N=9 (1,1/2,2,2,3) ID Dart 534 Er 70%	3.00 1.87					5.00	-2.97	×		END OF EXPLORATORY HOLE				5.00
								ID Dait 354 Li 70%														
-																						
6 -																						
:																						
-																						
7 -																						
-																						
8 -																						
-																						
] :																						
9 —																						
-																						
10 —																						
C	l Dame '															Hard B	oring / Chiselling	Groundwater Ent	ries			
Genera	I Remarks																Depths Duration (mir	ns) Tool No. Depth		ninutes		Sealed
																		1 2.00	1.030 to 1.07 iii ditei 20 f	imiutos.		
																1						
Notes									000 ALCERCE:							Status			Borehole			-
For exp	lanation of	symbols a	and abbreviation	ns see Key to E	Exploratory Hole Records	S. All	oject oject No.	CROWLE FLC F2033-22	OOD ALLEVIATION	GI							FINAL	Scale 1:50 Printed 23 Jan 2023 17:02:15		\ \	S02-W	,
uepins	ana reduce(u ieveis II	ธแชง. อแสโน	unokness giv	ron in prackets in depth (rried out fo		Water								IIIA		■T AGS			
Щ																		© Copyright SOCOTEC UK Limited	лос		Sheet 1 of 1	

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Checked		Depth		Dates		Meth	od		Equipment	Rig C	rew Logg	er Logged	Н	ole	Cas	sing		Depth Related Remarks					SOCOTEC
GIIGORGU	1.0	0 - 1.20	26 Sep	22 - 26 Sep 22	_ Ha	and dug inspecti	on pit to 1.	.20m.	Hand tools			26 Sep 22		Dia. (mm)		Dia. (mm)		Remarks		Ground Lev	el		4.32 mOD
	1.2	0 - 2.80	26 Sep	22 - 26 Sep 22	Dynan	nic (windowless)	sampling t	to 2.80m.	Dart 534			26 Sep 22	2.00 2.80	102 86	l		2.80 - 2.80	Barrel bouncing.		Coordinates	š	E.	478500.78
	-												2.00	00	l					National Gri	id	N	411433.02
Approved													1		l							System	OSGB
													1		l								
		_													<u> </u>								
Date	Tim	€		Samples			Field T	lests	Samp / Test	Coring	TCR % SCR %	Water added		Depth	Level	Legend	1	Strata Description		- - <u>-</u> -	Water	Back	cfill
Casing	Wat	er De	pth	Type & No.	Records	Depth	Type	Records	Casing Water	Depth (Diameter)	RQD %	Flush details		(Thicknes				Main	Detail	Ë	Entry		
0 -											T ~ T			(0.1	5) +4.17		Soft dark brov	wn slightly sandy SILT with frequent rootlets.					
1		0.2		ES 1										0.15 (0.3			(MADE GROU Soft dark brow	UND) wn slightly sandy slightly gravelly SILT. Gravel is fine to coarse	1				
4		0.4	.40	D 2										0.50	+3.82		subangular to (MADE GROU	subrounded of sandstone and siltstone	0.50 2nr pieces of ora	inge			
1		0.	.70	ES 3										(0.5	in)		Soft light brow	onub) win slightly sandy gravelly SILT. Gravel is subangular to ine to coarse of sandstone, siltstone, limestone and brick.	broken clay pipe.				
1		0.9	.90	D 4													subrounded fi (MADE GROU	ine to coarse of sandstone, siltstone, limestone and brick.					
1 -		1.	.10	ES 5										1.00	+3.32	×	Soft friable or	angish brown slightly sandy silty CLAY. RCIA MUDSTONE)	1.00 Thin angular pied (70mm x 150mm x 10	;e of metal mm).			
1		1.20	.20 - 2.00	D 6 L	100% rec, dia 87mm	1.20 - 1.65	SPT S	N=6 (1,1/1,1,2,2) ID Dart 536 Er 70%	0.00 Dry							××	(Probable ME	RCIA MUDSTONE)	,	,			
4		1.3	.30	D7	100 /0 1CC, dia 0/111111									(0.9	95)	×	×						
1		1.50 -	- 1.95	B 8												$\overline{\times}$							
_ 1				5.4										1.95	+2.37	× ×	×						
2 —		2.0 2.0		D 10 D 9	100% rec, dia 57mm	2.00 - 2.45	SPIS	N=45 (5,5/6,12,12,15) ID Dart 536 Er 70%	0.00 Dry						2.01		Very weak thin	nly laminated light bluish grey MUDSTONE. DSTONE, GRADE II)					
1			- 2.80	L L	,									(0.6	55)		(2. 10.51	50.6.12, 0.0.52.11)	2.20-2.25 Band of ora brown slightly sandy of	ngish Jay.			
4		2.	.50	D 11																,			
1		2.		D 12										2.60 (0.2	+1.72		Stiff to very st	iff dark orangish brown slightly sandy CLAY.					
_ 1		2.8	.80	D 13		2.80 - 3.03	SPT S	50 (10,11/35,15 for 0mm)	0.00 Dry					2.80	+1.52		(MERCIA MU	DSTONE, GRADE IVb) END OF EXPLORATORY HOLE				2.80	
3 —								ID Dart 536 Er 70%															
-																							
-}																							
-																							
4 —																							
=																							
7																							
1																							
5 —																							
=																							
1																							
-																							
=																							
6																							
1																							
1																							
7																							
1																							
7 —																							
-																							
-																							
7																							
7																							
8 —																							
}																							
-																							
-																							
9 —																							
1																							
=																							
=																							
10																							
																Hard D	Roring / Chicallin-	Consideration 5	tries				
General Rema		,															Boring / Chiselling Depths D	uration (mins) Tool Groundwater En					Sealed
No groundwate	r encount	ered.														- [1					
																- [1					
																1		1					
Notes							nia at	000147 5 51 3	OD ALLEVATION	CI						Status	3	01- 4:50	Borehole				
For explanation	of symbo	ls and abb	reviation	s see Key to Ex	ploratory Hole Records	s. All	oject Diect No		OD ALLEVIATION	GI						- [FINIA	Scale 1:50	I	14	ICUS E	<u>-</u>	
depths and red	iced leve	s in metres	s. Stratun	π tnickness give	en in brackets in depth		oject No.	F2033-22	Votor							- [FINA	Printed 23 Jan 2023 17:02:15	■T AGS	VV	/S03-E	•	
						l Ca	rried out fo	or Severn Trent W	valei							1		© Copyright SOCOTEC UK Limited	AGS	1	Sheet 1 of 1		



	ecked	De	epth	Dates		Meth			Equipmen		rew Log	ger Logged		lole		sing		Depth Related Remarks			SOCOTEC
i .		1.20	- 1.20 07 D - 5.00 07 D	ec 22 - 07 Dec 2 ec 22 - 07 Dec 2	22 Ha 22 Dynan	and dug inspecti mic (windowless)	ion pit to 1.2 sampling t	20m. to 5.00m.	Hand tools Dart 428			07 Dec 22 07 Dec 22	2.00	Dia. (mm) 116 102	Depth	Dia. (mm)) Depth	Remarks	Ground Leve Coordinates		4.96 mOD E 478625.15
An	proved	┨											3.00 4.00	102 86 76					National Gri	id	N 411872.96
7.4													5.00	/6							System OSGB
_			<u> </u>			T				1	TCD %					<u> </u>	1				
	Date Casing	Time Water	Depth	Sampl Type & No.		Depth	Field 1 Type	Tests Records	Samp / Test Casing Water	Coring Depth (Diameter)	TCR % SCR % RQD	Water added Flush details		Depth (Thickness	Level	Legend	1	Strata Description Main Detail	hisel.	Water Entry	Backfill
0 —	Casing	vvater	0.20	ES 1	Records	Deptil	Туре	Records	Casing Water	(Diameter)	%	i iusii detalis		(0.1 0.10		6	MACADAN Crovish br		5		0.10
-			0.30 - 0.90	B 4	_									0.10	(0) +4.6	6		of limestone, siltstone and sandstone.			
-			0.50 0.50	D 2 ES 3	_									(0.6	0)		Yellowish I angular to	brown slightly gravelly clayey fine and medium SAND. Gravel is subangular fine and medium of brick, sandstone and siltstone.			
1 -			1.00	D 5	_									0.90	+4.0	6	(MADE GF Loose to n	ROUND) nedium dense dark brown slightly gravelly clayey fine and medium avel is angular to subangular fine to coarse of sandstone and			
:			1.00 1.20 - 1.45			1.20 - 1.65	SPT S	N=5 (0,0/0,1,2,2) ID Dart 428 Er 67%									siltstone. (REWORK				1.20
-			1.20 - 2.00 1.30 - 2.00 1.50	B 10 D 9	100% rec, dia 102mm			15 5411 420 21 01 70									(KEWOKI	(CD)			
			1.50	ES 8	_									(1.7	(0)						
2 -			2.00 - 3.00	L	100% rec, dia 87mm	2.00 - 2.45	SPT S	No recovery													
			2.30 - 3.00	B 12	-			ID Dart 428 Er 67%												1 🔫	
-														2.60	+2.3	6	Medium de	ense yellowish brown slightly gravelly fine SAND. Gravel is angular		1 🗷	
3 —			3.00 - 3.45		-	3.00 - 3.45	SPT S	N=26 (2,6/6,7,7,6)									(SUTTON	ense yellowish brown slightly gravelly fine SAND. Gravel is angular ular fine and medium of sandstone and siltstone. SAND FORMATION)			
			3.00 - 4.00	L	100% rec, dia 77mm			ID Dart 428 Er 67%													
-																	•				
														(2.4	.0)						
4 -			4.00 - 5.00		100% rec, dia 67mm	4.00 - 4.45	SPT S	N=11 (2,2/2,3,3,3) ID Dart 428 Er 67%	-												
			4.30 - 5.00	B 14	-																
5 —			5.00 - 5.45	D 15	-	5.00 - 5.45	SPT S	N=17 (2,3/5,4,4,4)						5.00	-0.0	4		END OF EXPLORATORY HOLE			5.00
								ID Dart 428 Er 67%													
-																					
6 -																					
-																					
7 -																					
-																					
8 —																					
] -																					
9 —																					
] :																					
10 —																					
Genera	ıl Remarks		<u> </u>							I .							Boring / Chisell	ling Groundwater Entries			
																	Depths	Duration (mins) Tool No. Depth Remarks 1 2.60 Rose to 2.36 m after 20	minutes.		Sealed
Notes						<u> </u>			200 ALL 5101-15							Statu	s	Borehole			
For exp	lanation of and reduce	symbols d levels i	and abbreviat in metres. Stra	ions see Key to tum thickness a	Exploratory Hole Records iven in brackets in depth	S. All	oject oject No.	CROWLE FLO F2033-22	OOD ALLEVIATION	Gl								Scale 1:50	W	/S04-E	
			-	9.	,		rried out fo		Water									Printed 23 Jan 2023 17:02:16 © Copyright SOCOTEC UK Limited AGS		Sheet 1 of 1	

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COCOTEC

Checked	0.	Depth .00 - 1.2	20 11 Oct	Dates 22 - 11 Oct 22		Methorand dug inspection	on pit to 1.2		Equipme Hand too	ls	CrewLo	ogger	11 Oct 22		ole Dia. (mm)		sing Dia. (mm) Depth	Depth Related Remarks	Ground Le	vel	3.22 mOD
	1.	.20 - 5.0	00 12 Oct	22 - 12 Oct 22	Dynan	nic (windowless)	sampling t	to 5.00m.	Dart 53	1			12 Oct 22	4.00 5.00	113 101	4.00	113			Coordinate National G		E 477707.56 N 412098.48
Approve	d																			National G	iiu	System OSGB
						1											<u> </u>					
Dat Casi			Depth	Samples Type & No.	s Records	Depth	Field T Type	Tests Records	Samp / Test	Depth	TCR % SCR % RQD %		Water added Flush details		Depth (Thicknes	Level	Legen	d	Strata Description Main De	il d	Water Entry	Backfill
0 =			0.20	ES 1		2000.	.,,,,	11000100	outing 1121	(Diamotor)	76				(0.4			Dark brown (MADE GR	n sitty fine and medium SAND with roots. 0.00-0.01 Plasti COUND) 0.01-0.02 Geote	mesh. tile.		Flush cover
															0.40	+2.82	2	Medium der	onse dark orange mottled black slightly clayey fine and medium	mesh.		0.50
			0.80	ES 2															SAND FORMATION)			
1 - 11 00		Dry	1.20	D 3		1.20 - 1.65	SPT S	N=11 (1,2/2,3,2,4)	1.00 Dr	,												
= 120	ct 22 08	Dry 1	1.20 - 2.00 1.50	L D4	100% rec, dia 87mm			ID Dart 534 Er 70%							(1.9	00)						
			1.95	D 5															1.90-2.30 Becor	ng grey.		
2 —		2	2.00 2.00 - 3.00	D 6 L	80% rec, dia 87mm	2.00 - 2.45	SPT S	N=27 (2,5/6,6,6,9) ID Dart 534 Er 70%	2.00 Dr						2.30	+0.92	,					2.30
-			2.40	D7											2.50		ste ste	strong orga	k brown and black locally spongy pseudo-fibrous PEAT with a very anic odour. ed dark grey fine and medium SAND.			2.30
			2.70 3.00	D 8		3.00 - 3.45	SPT S	N=7 (3,3/2,1,2,2)	3.00 2.8	.					(0.8	80)		(SUTTON S	SAND FORMATION)		1 Z	
3 —		3	3.00 - 4.00	L	100% rec, dia 87mm	5.00 - 5.45	3513	N=7 (3,3/2,1,2,2) ID Dart 534 Er 70%	3.00 2.8						3.30	-0.08	×	Firm 41'''	f dark brownish grey silty CLAY.			3.30
-			3.40 3.65	D 10 D 11											3.60		×	(Possible M	MERCIA MUDSTONE, GRADE IVb) 3.50-3.60 Recovery gravelly CLAY Gravel is fine and medium lithogelists of gravelly clay. Gr	/el is		SP
4 —			3.85 4.00	D 12 D 13		4.00 - 4.45	SPT S	N=19 (3,6/3,4,5,7)	4.00 2.8	,					3.95	-0.74		mudstone. (Probable N				
-		4	4.00 - 5.00 4.05	L D 14	90% rec, dia 77mm			ID Dart 534 Er 70%							4.15	-0.94		(MERCIA M Firm to stiff	MUDSTONE, GRADE II) dark red slightly gravelly CLAY. Gravel is angular fine to coarse 3.70-3.95 Becorgrey mottled bla			
			4.40 4.62	D 15 D 16											(0.6			mudstone li (MERCIA M	ithorelicts. MUDSTONE, GRADE III) 4.60-4.68 Thickle mudstone and communications and communications.			
5 - 12 O	ct 22 17	700 .81	5.00	D 17		5.00 - 5.42	SPT S	50 (7,7/6,12,15,17 for	4.00 2.8						4.78 (0.0 4.85	-1.56 1.64 -1.78 -1.78	<u> </u>	(MERCIA M	thinly laminated grey MUDSTONE. 4.68-4.78 Firm t			5.00
								45mm) ID Dart 534 Er 70%							5.00 (0.1	5)		red and gre	dark red slightly gravelly CLAY. Gravel is fine to coarse angular which was a substance of the substance of			
-																			END OF EXPLORATORY HOLE			
6 =																						
-																						
7 —																						
=																						
8 —																						
1 =																						
9 —																						
10 —																						
General Ren	narks																Hard	Boring / Chisellir Depths	ng Groundwater Entries Duration (mins) Tool No. Depth Remarks 1 2.87 Rose to 2.84 m after	20 minutes.		Sealed
Notes						5.0	ioot	CDOM E EL C	100 ALLEVATO	N CI							Statu	IS	Scole 1:E0 Boreh	e		
For explanation depths and re	on of symb educed leve	ools and els in m	abbreviation etres. Stratur	s see Key to Ex n thickness give	xploratory Hole Records en in brackets in depth o	column.	ject ject No.	F2033-22	OOD ALLEVIATIO	IN GI								FIN	Scale 1:50 Printed 23 Jan 2023 17:02:16 © Copyright SOCOTEC UK Limited AGS	V	VS05-A	\ <u> </u>
						Car	ried out fo	or Severn Trent V	Vater										© Copyright SOCOTEC UK Limited AGS		Sheet 1 of 1	

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Checked		pth	Dates		Meth	od		Equipment	t Rig C	rew Log	ger Logged	н	ole	Cas	ina	1	Depth Related Remarks			SOCOTEC
Спескеа	0.00 -	- 1.20 11 0	Oct 22 - 11 Oct 2		and dug inspecti	on pit to 1.2		Hand tools		Jew Logg	11 Oct 22	Depth	Dia. (mm)	Depth	Dia. (mm)	Depth	· · · · · · · · · · · · · · · · · · ·	Ground Lev		3.30 mOD
	1.20 -	- 5.00 11 0	Oct 22 - 11 Oct 2	2 Dynan	nic (windowless)	sampling t	0 5.00m.	Dart 534			11 Oct 22	3.00 4.00	113 101	3.00	113	1		Coordinates		E 477698.98
Approved	ł											5.00	84			1		National Gri	id	N 412126.60
																1		l		System OSGB
																1		i		
Date	Time		Sampl	es		Field 1	Tests	Samp / Test	Coring	TCR %	Water added		Donth	Laval			Strata Description		Water	Backfill
Casing	Water	Depth	Type & No.	Records	Depth	Туре	Records	Casing Water	Depth (Diameter)	SCR % RQD %	Flush details		Depth (Thickness	Level	Legend		Main Detail	Chise	Entry	Dackiiii
0 -					200	.,,,,		out in the second	(Diameter)	76			(0.1			Light grey s	ey subangular fine to coarse GRAVEL of limestone. 0.00-0.10 Two layers of	of plastic		Flush cover
		0.20	ES 1	-									0.10	0)		(MADE GR Dark brown	own clayey fine and medium SAND with frequent roots and rootlets. 0.20 Large piece of wo	ood		
1 4		0.40	D 2	-									0.50	+2.80		Possible N	e MADÉ GROUND) se grey mottled orange slightly clayey fine and medium SAND.	m.		0.50
]		0.60 0.80	ES 3 D 4													(SUTTON S	N SAND FORMATION)			
1 -		0.60	04																	
'		1.20 - 2.00	L	88% rec, dia 87mm	1.20 - 1.65	SPT S	N=2 (0,0/0,0,1,1)								+ +					
							No recovery ID Dart 534 Er 70%													
-		1.60	D 5	_			ID Dait 554 El 70%						(2.2	5)			1.50-2.00 Occasional porganic material proba			
1													,					•		
2 —		2.00 - 3.00	L	100% rec, dia 87mm	2.00 - 2.45	SPT S	N=4 (2,3/1,1,0,2)										2.00-2.65 Grey mottled sand.	orange		
		2.20	D 6	-			No recovery ID Dart 534 Er 70%										2.10-2.30 Sand is very			
		2.50	D 7	-													2.40-2.45 Large pieces likely roots 250mm x 2	of wood 0mm.		
													2.75	+0.56			2.65-2.75 Soft to firm b	rownish		
]		2.80 2.95	D 8 ES 9	_	3.00 - 3.45	SPT S	N=8 (1,1/1,2,1,4)						(0.3	0)	alle alle	Spongy dai	dark brown fibrous PEAT with a very strong organic odour. grey very sandy clay w organic odour.	AUT	1 🗲	2.80
3 -		3.00 3.00 - 4.00	D 10	100% rec, dia 77mm	3.00 - 3.45	3713	N=8 (1,1/1,2,1,4) ID Dart 534 Er 70%						3.05	+0.26	الدياديان	Firm dark b	k brownish grey very sandy CLAY with a strong organic odour.			
				100 % fee, did / / IIIIII									(0.5	5)		(Possible N	e MERCIA MUĎSTÓNE, GRADE IVb)			
-		3.50	D 11	-									3.60	-0.30	V = -	Firm groves	v, siltv CLΔV			
1		3.70	D 12	-									3.80	-0.50		(Probable N	y silty CLAY. e MERCIA MUDSTONE) 3.80-4.00 Mudstone.			3.80 SP
4 —		3.90 4.00	D 13 D 14		4.00 - 4.45	SPT S	N=17 (3,3/3,4,4,6)						0.00				ey mudstone interbedded with stiff dark red CLAY. A MUDSTONE) 4.00-4.25 No recovery.			SP
_		4.00 - 5.00	L	40% rec, dia 67mm			ID Dart 534 Er 70%										4.25-4.35 Clay.			
1 -													(1.2	0)			4.35-4.65 No recovery.			
1			5.45														4.65-4.88 Clay.			
		4.80 5.00	D 15 D 16		5.00 5.20	ept e	50 (6,6/11,16,17,6 for						5.00	-1.70			4.88-4.92 Mudstone.			5.00
5 -		5.00	D 16		5.00 - 5.38	3713	5mm)						5.00	-1.70			END OF EXPLORATORY HOLE 4.92-5.00 Clay.			5.00
1							ID Dart 534 Er 70%													
1 -																				
6 🚽																				
1																				
1																				
' -																				
1																				
]																				
8 —																				
4																				
]																				
9 —																				
=																				
-		1																		
10 -																				
0															Hard P	Boring / Chiselli	elling Groundwater Entries			
General Remarks																	Duration (mins) Tool No. Depth Remarks	inutes Coon-	10	Sealed
															1		1 2.87 Rose to 2.78 m after 20 m	mutes. Seepag	е	
															1					
Natas															- Inc	_				
Notes For explanation of	evmholo	and abbrovice	one see Koute	Evoloratory Hole Peccada	_{s ΔII} Pro	oject	CROWLE FLO	OD ALLEVIATION	GI						Status	5	Scale 1:50			
depths and reduce	d levels i	n metres. Stra	tum thickness gi	Exploratory Hole Records ven in brackets in depth	column. Pro	ject No.	F2033-22								1	FIN	INAL Printed 23 Jan 2023 17:02:16	W	/S06- <i>/</i>	۱ ا
					Car	rried out fo	Severn Trent W	/ater							1		Printed 23 Jan 2023 17:02:16 © Copyright SOCOTEC UK Limited © Copyright SOCOTEC UK Limited		Sheet 1 of 1	
1																	5 55pyrigin 5000 (E0 on Elimited	`		

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Ch	ecked	Dep	oth	Dates	<u> </u>	Meth	od		Equipmen	t Ria C	rew Log	ger Logged	Н	lole	Cas	ing	ı	Depth Related Remarks	Т		SOCOTEC
_		0.00 -	1.20 27 Se	p 22 - 27 Sep 2 p 22 - 27 Sep 2	2 Ha	and dug inspecti nic (windowless)	ion pit to 1.	20m. to 4.00m	Hand tools Dart 534			27 Sep 22 27 Sep 22	Depth 3.00	Dia. (mm)		Dia. (mm) 113	Depth	Remarks Hole collapsed back to 1.20m after casing removed and heavy downpour.	Ground Le		3.68 mOD
		1.20	4.00 27 00	p 22 - 21 Ocp 2	.z Dynan	iic (wii idowicss)	, sampling	to 4.00m.	Dail 354			27 OCP 22	4.00	113 101	3.00	113	1.20 - 4.00	Hole collapsed back to 1.20m after casing removed and neavy downpour.	Coordinate		E 477601.99
Ap	proved																		National G	'la	N 412307.22 System OSGB
																					2,0.0
		Щ				<u> </u>			_	I .	TCR %					T					
	Date	Time		Sample			Field 1		Samp / Test	Coring Depth	SCR %	Water added		Depth	Level	Legend		Strata Description	3	Water Entry	Backfill
0 —	Casing	Water	Depth	Type & No.	Records	Depth	Type	Records	Casing Water	(Diameter)	%	Flush details		(Thicknes		*******	MACADAM.	Main Detai	<u> </u>		
-			0.20	ES 1	-									0.30	0) +3.38		8				0.30
_			0.35	ES 2										0.40			:\ (FILL)	angular to subrounded fine to coarse GRAVEL of limestone.			
-			0.80	ES 3										0.40				ange mottled grey clayey fine and medium SAND. AND FORMATION)			
1 —			1.00 - 1.20	B 5	_									(1.0	0)						1.00
			1.20	D 4		1.20 - 1.65	SPT S	N=2 (0,0/1,1,0,0)	0.00 Dry												1.20
_			1.20 - 2.00 1.50	L D6	88% rec, dia 87mm			ID Dart 536 Er 70%						1.40	+2.28			ed grey and green slightly gravelly clayey fine and medium			
_			1.70	D 7	_									(0.5	5)		limestone ar	vel is subangular to rounded fine and medium of sandstone, 1.60-1.95 Becomin nd mudstone.	g gravelly.		
2 —			2.00	D 8		2.00 - 2.45	SPT S	N=1 (1,1/0,1,0,0)	2.00 Dry					1.95	+1.73		• •	AND FORMATION) soft reddish brown mottled grey slightly sandy slightly gravelly			
-			2.00 2.00 - 3.00	D9 L	100% rec, dia 87mm	2.00 - 2.40	0110	ID Dart 536 Er 70%	2.00 Diy					(0.4	5)		CLAY. Grave	el is angular to subangular fine of grey weak sandstone.			
-			2.20	D 10										2.40	+1.28		`	brown sandy gravelly CLAY. Gravel is subangular to subrounded 2.35-2.40 Slightly sandy.			
]			2.50	D 11										(0.4	5)		fine and med	dium of mixed lithologies. UDSTONE, GRADE V)			
-			2.90	D 12	-									2.85	+0.83		`	ey fine and medium SAND.		1 🗸	
3 —			3.00 3.00 - 4.00	D 13 L	100% rec, dia 77mm	3.00 - 3.45	SPT S	N=20 (3,4/4,5,5,6) ID Dart 536 Er 70%	3.00 Damp					3.00	5) +0.68		(MERCIA MI Stiff to very	UDSTONE) stiff light grey mottled brownish grey and grange sandy CLAY with		1 -	
]			3.20	D 14	-												llithorelicts o	of moderately weak thinly laminated light grey mudstone. UDSTONE, GRADE III).			
-			3.50	D 15	-									(1.0	0)		(METOD CIM	obotone, orotole mj.			
-			3.90	D 16																	
4 —			4.00	D 10	_	4.00 - 4.31	SPT S	50 (11,13/26,13,11 for 5mm)	3.00 Damp					4.00	-0.32			END OF EXPLORATORY HOLE 4.00 Becoming gree orangish brown sill			4.00
-								ID Dart 536 Er 70%										orangion brown on	y oldy.		
-																					
5 —																					
_																					
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6 -																					
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]																					
9 —																					
] =																					
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10																					
10 —		İ																			
Genera	l Remarks			I	ı	I	1	1	1			I		1			Boring / Chisellin			1	Cantact
																'	Depths	Duration (mins) Tool No. Depth Remarks 1 2.84 Remained at 2.84 m a	fter 20 minutes. S	eepage	Sealed
L																_]					
Notes						Dro	oject	CROWLE ELO	OOD ALLEVIATION	GI						Status	3	Scale 1:50			
For exp	lanation of s	symbols a d levels in	and abbreviation metres. Strati	ns see Key to E ım thickness aiv	Exploratory Hole Records ven in brackets in depth o	S. All	oject No.	F2033-22	JUD , ILLE VIAI ION								FIN		V	/S07-A	.
1	2000			giv			rried out fo		Water									ACC			•
Ц																		© Copyright SOCOTEC UK Limited		Sheet 1 of 1	

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Chaskad		pth	Dates		Meth	od		Equipmen	Rin C	rew Logg	ger Logged	н	ole	Cas	ina	Ī	Depth Related Remarks				SOCOTEC
Checked	0.00	- 0.30 29	Sep 22 - 29 Sep 2	22 Br	oken out inspect	ion pit to 0	.30m.	Hydraulic bra	er	rew Logg	29 Sep 22	Depth	Dia. (mm)	Depth	Dia. (mm)	Depth Remarks	Deptil Related Remarks		Ground Lev	vel	4.60 mOD
			Sep 22 - 29 Sep 2 Sep 22 - 29 Sep 2		and dug inspecti nic (windowless)			Hand tools Dart 428			29 Sep 22 29 Sep 22	2.00 3.00	113 101	2.00	113				Coordinate	s	E 477440.25
Approved	1											3.75	76						National Gr	rid	N 412486.18
																					System OSGB
Date	Time		Sample	es		Field 1	Tests	Samp / Test	Coring	TCR % SCR %	Water added		Depth	Level	Legend		Strata Description		<u> </u>	Water	Backfill
Casing	Water	Depth	Type & No.	Records	Depth	Туре	Records	Casing Water	Depth (Diameter)	ROD	Flush details		(Thickness				Main	Detail	Chis	Entry	
0 -		0.20	ES 1										(0.3	0)		MACADAM.					
]		0.20	E3 1										0.30	+4.30		Dark brown and black gravelly of	clayey fine to medium SAND. Gravel is				0.30
-		0.50	ES 2	-												angular to subrounded fine to co (MADE GROUND)	oarse of sandstone and mudstone.				
1		0.75	ES 3	-									(0.9	0)		` '		0.80-0.90 Two subro			
1 —																		cobbles of mudstone 150mm x 100mm x 5	50mm).		
-		1.20 1.20	D 5 ES 4		1.20 - 1.65	SPT S	N=13 (2,2/3,3,3,4) ID DART 428 Er 67%	0.00 Dry					1.20	+3.40			nedium SAND. Slight hydrocarbon odour a	nd 1.00 Folded angular (Approx. 100mm x 7	netal sheet)mm).		1.20
4		1.20 - 2.0 1.40		100% rec, dia 87mm			1.5 57.1.1. 1.20 2. 0.7.2						(0.6	5)		oily/slimey to touch, possibly co (MADE GROUND)	ontaminated.	`	,		
]		1.70	D7															1.60-1.85 Orange an mottled.	1 brown		
2 —		2.00	D 8		2.00 - 2.45	SPT S	N=8 (2,2/2,2,2,2)	2.00 Dry					1.85	+2.75	*******		ddish brown mottled black and purple sligl				
_		2.00 - 3.0 2.10		100% rec, dia 77mm			ID DART 428 Er 67%						(0.7	5)		mudstone lithorelicts and rare s		2.15-2.40 Brown mo	tled with		
†		2.30	ES 10	-									(3.7)	•		(MERCIA MUDSTONE, GRADE	= IVa)	bluish grey.	firm to atte		
-		2.50 2.70	D 11 D 12	-									2.60	+2.00		Brown clayey fine to medium SA	AND.	2.50-2.60 Becoming Piece of organic mat			
]		2.80	D 13	-									2.74	,		(MERCIA MUDSTONE)	LAY. Gravel is angular to subrounded fine	wood <50mm. 2.80-2.95 Predomina	antly blue		
3 —		3.00 3.00 - 3.7	D 14	100% rec, dia 57mm	3.00 - 3.45	SPT S	N=44 (5,5/7,7,15,15) ID DART 428 Er 67%	2.00 Dry					3.00	6) +1.60		coarse of bluish grey thinly lami	inated mudstone lithorelicts. Clay possibly		ne with		
‡		3.20	D 15	.55.5 150, 414 07 11111			.5 5, 420 21 07 /0						(0.4	•		interbedded with mudstone. (MERCIA MUDSTONE, GRADE	≣ III)	3.20-3.30 Friable			
-		3.50	D 16	-									3.40	+1.20 5)		(MERCIA MUDSTONE).		Λ			
		3.75	D 17	_	3.75 - 3.98	SPT S	50 (12,13 for	2.00 Dry					3.75	+0.85		Brown slightly sandy gravelly Cl	LAY. Gravel is angular to subrounded fine inated mudstone lithorelicts. Clay possibly	3.65-3.75 Thinly lam	nated grey		3.75
4 —							5mm/22,25,3 for 0mm) ID DART 428 Er 67%									interhedded with mudetone					
‡																(MERCIA MUDSTONE, GRADE	= III) OF EXPLORATORY HOLE				
1																					
3																					
_																					
5 —																					
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-																					
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											Boring / Chiselling	Groundwat	er Entries								
General Remarks No groundwater en	eneral Remarks p groundwater encountered.												Depths Duration (mins)		pth Remarks			Sealed			
110 groundwater en	ioouniert	Ju.													1						
															1						
N-4															- Inc			I _F			
Notes For explanation of s	evmbolo	and abbrovis	ations see Koute F	Evoloratory Holo Possed	e ΔII Pro	ject	CROWLE FLO	OD ALLEVIATION	GI						Status	S	Scale 1:50	Borehole			
depths and reduced	d levels i	n metres. St	ratum thickness gi	Exploratory Hole Records ven in brackets in depth	column. Pro	ject No.	F2033-22								1	FINAL	Printed 23 Jan 2023 17:02:17		٧	/ S08- <i>/</i>	\
					Ca	rried out fo	Severn Trent W	/ater									© Copyright SOCOTEC UK Limited	AGS		Sheet 1 of 1	
																	5 55pj. igin 5000 i E0 on Elillitei				



		Dep	oth	Dates	1	Meth	od		Equipment	Pia C	rew Log	gor Loggod		lole	Ca	sing	1	Depth Related Remarks	T		SOCOTEC
Che	ecked	0.00 -	1.20 08 Dec	22 - 08 Dec 2	22 Ha	and dug inspecti	on pit to 1.2	20m.	Hand tools		rew Log	08 Dec 22	Depth	Dia. (mm)		Dia. (mm)	Depth	Remarks	Ground Leve	el	2.16 mOD
		1.20 -	4.00 08 Dec	22 - 08 Dec 2	22 Dynam	nic (windowless)	sampling t	o 4.00m.	Dart 428			08 Dec 22	2.00 3.00	116 102					Coordinates	5	E 476979.64
Ann	proved	l											4.00	86					National Gri	id	N 413113.87
7	noveu																				System OSGB
	Date	Time		Sample	os.		Field T	nete	Samp / Test	Coring	TCR %	Water added				Т		Strata Description		I	
			5	•						Depth	SCR % RQD			Depth	Level	Legend			hise	Water Entry	Backfill
0 —	Casing	Water	Depth 0.10 - 0.30	Type & No.	Records	Depth	Туре	Records	Casing Water	(Diameter)	%	Flush detail	s	(Thickness	-		MACADAM.	Main Detail	ū		0.10
			0.20	D 2	-									0.10			Greyish brown	n slightly sandy silty angular to subangular fine to coarse imestone, siltstone and sandstone.			
1 4			0.20 0.30 - 1.00	ES 1 B 6										0.30	.0) 1.00		(FILL)	/			
			0.50	D 5	-												Yellowish brow fragments.	own slightly gravelly silty fine and medium SAND with rare wood			
			0.90	ES 4	=									(1.2	(0)		(RĚWORKED	D)			
1 -			400 445			4.00 4.05	ODT O	N 0 (4 4 (4 0 0 0)													4.00
			1.20 - 1.45 1.20 - 2.00	D7 L	100% rec, dia 102mm	1.20 - 1.65	SPT S	N=9 (1,1/1,2,3,3) ID Dart 428 Er 67%													1.20
														1.50	+0.66		Reddish brow	vn slightly sandy subangular to subrounded fine to coarse			
_			1.70	D 8	=									1.70	+0.46		GRAVEL of m	nixed lithologies including sandstone and quartz. RCIA MUDSTONE, GRADE V)			
2 —			1.90 2.00 - 3.00	D 9 L	100% rec, dia 87mm	2.00 - 2.45	SPT S	N=2 (0,0/0,0,1,1)						2.00	0) +0.16		Firm reddish b	brown mottled grey gravelly CLAY. Gravel is subangular of			
			2.10	D 10	10070100, and 0111111			No recovery ID Dart 428 Er 67%						(0.4	0)	× ^ ×		RCIA MUDSTONE, GRADE IVa)		1 7	
1			2.30 - 3.00	B 12 D 11	-			15 5411 120 21 01 70						2.40	-0.24	××××	Brown slightly quartz.	y sandy silty subrounded to rounded fine to coarse GRAVEL of		1	
]		1	2.50	ווע													(Possible ME	RCIA MUDSTONE, GRADE V) eddish brown mottled grey slightly gravelly CLAY. Gravel is			
]		1															subangular fin	ne and medium of weak sandstone.			
3 —		1	3.00 - 3.45 3.00 - 4.00	D 13 L	30% rec, dia 87mm	3.00 - 3.45	SPT S	N=17 (1,3/3,4,5,5) ID Dart 428 Er 67%						(1.5	:0)		(MERCIA MUI	JDSTONE, GRADE IVb)			
		1	5.55 4.00		55.5.55, 414 07111111			.5 5a.t 420 Et 01 /0						(1.5	· · ·)		•				
		1																			
																<u> </u>					
4 —			3.85 4.00	D 14 D 15		4.00 - 4.45	SPT S	N=50						3.90	-1.74 0) -1.84			dish brown mottled grey gravelly CLAY. Gravel is subangular to			4.00
-			4.00	D 10		4.00 4.40	0.10	(5,8/12,13,13,12)						4.00	U) -1.04		rounded fine t	to coarse litherelists of extremely week mudetone			4.00
								ID Dart 428 Er 67%									(IMEROD IMO	JDSTONE, GRADE IVa) END OF EXPLORATORY HOLE			
_																					
5 —																					
-																					
-																					
6 —																					
]																					
-																					
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General	l Remarks	_					_										Boring / Chiselling Depths D	Ouration (mins) Tool No. Depth Remarks			Sealed
																		1 2.30 Rose to 2.10 m after 20	minutes.		
Notes						Pro	ject	CROWLE FLO	OOD ALLEVIATION	GI						Status	3	Scale 1:50			
For expl	lanation of s	symbols a	and abbreviation	ns see Key to I	Exploratory Hole Records iven in brackets in depth of	S. All	ject No.	F2033-22	, SD , LLL VIAIION	٥,							FINA		W	/S09-C	
Laspais 6		07013 111	Sualu	u	S. dokoto in doptii (Vater								. 114/1	100			
<u></u>	Carried out for Severn Trent Water											© Copyright SOCOTEC UK Limited	\$	Sheet 1 of 1							



APPENDIX C INSTRUMENTATION AND MONITORING

Monitoring Installations Summary	Table C1
Groundwater Monitoring	Table C2
Gas Monitoring	Table C3

Monitoring Installations Summary



_									
	Instrument Reference	Instrument Type (See Notes)	Installation Date, dd/mm/yyyy	Pipe Diameter, mm	Instrument Base, mbgl	Response Zone Range, mbgl	Pipe Top Details	Headworks	Remarks
	BH01-W (1)	SP	25/10/2022	50	8.40	2.20 to 8.40	Gas tap	Flush cover	
	WS02-W (1)	SP	04/10/2022	50	3.70	2.10 to 3.70	Gas tap	Flush cover	
	WS05-A (1)	SP	12/10/2022	50	3.30	2.30 to 3.30	Gas tap	Flush cover	
	WS06-A (1)	SP	11/10/2022	50	3.80	2.80 to 3.80	Gas tap	Flush cover	



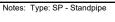
Carried out for

Severn Trent Water

Groundwater Monitoring



Instrument Reference	Instrument Type	Instrument Base, mbgl	Date Time dd/mm/yyyy hh:mm:ss	Result	Comments
BH01-W (1)	SP	8.40	21/11/2022 11:19:00	1.10	Visit 1 - well development
BH01-W (1)	SP	8.40	08/12/2022 10:55:00	0.99	Visit 2 - water sampling
BH01-W (1)	SP	8.40	19/12/2022 11:09:00	0.91	Visit 3
WS02-W (1)	SP	3.70	27/10/2022 09:15:00	1.03	Fieldwork
WS02-W (1)	SP	3.70	21/11/2022 10:43:30	0.82	Visit 1 - well development
WS02-W (1)	SP	3.70	08/12/2022 10:03:00	0.72	Visit 2 - water sampling
WS02-W (1)	SP	3.70	19/12/2022 10:53:00	0.85	Visit 3
WS05-A (1)	SP	3.30	27/10/2022 10:27:00	1.10	Fieldwork
WS05-A (1)	SP	3.30	21/11/2022 09:52:00	0.64	Visit 1 - well development
WS05-A (1)	SP	3.30	08/12/2022 12:16:00	0.86	Visit 2 - water sampling
WS05-A (1)	SP	3.30	19/12/2022 10:25:00	0.83	Visit 3
WS06-A (1)	SP	3.80	27/10/2022 09:55:00	1.45	Fieldwork
WS06-A (1)	SP	3.80	21/11/2022 09:16:00	0.60	Visit 1 - well development
WS06-A (1)	SP	3.80	08/12/2022 13:10:00	0.44	Visit 2 - water sampling
WS06-A (1)	SP	3.80	19/12/2022 10:35:00	1.17	Visit 3



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Gas Monitoring Summary



C3

Notes: Peak gas concentrations, flow rates and differential pressures represent the interpreted highest values (or lowest gas concentration value for oxygen) recorded during the monitoring period. Steady state values are taken as the end of monitoring values. Values below the limit of detection (LoD) of the monitoring equipment are recorded as the LoD value preceded by '<' (eg <0.1).

Project CROWLE FLOOD ALLEVIATION GI
Project No.

F2033-22

Project No. F2033-22

Carried out for Severn Trent Water

		Carried out for Severir Helic Water					ļ										
Location	Date	Air Temp, oC	Baro Press, mbar	Diff Press (pk), Pa	Diff Press (st), Pa	Gas Flow Rate (pk), I/hr	Gas Flow Rate (st), I/hr	CH4 (pk), %vol	CH4 (st), %vol	CO2 (pk), %vol	CO2 (st), %vol		O2 (st), %vol	H2S (pk), ppm	H2S (st), ppm	CO (pk), ppm	CO (st
BH01-W (1)																	
	21 Nov 2022	3	996	<1	<1	0.7	0.6	0.3	0.3	1.6	1.6	11.4	11.4	<1	<1	<1	<1
	08 Dec 2022	1	1012	<1	<1	0.1	0.1	0.4	1 0.3	6.9	3.9	19.8	19.8	3 <1	<1	<1	<1
	19 Dec 2022	12	1002	<1	<1	<0.1	<0.1	0.2	0.2	0.9	9.0	7	8	3	2	2 <1	<1
WS02-W (1)																	
	27 Oct 2022	13	1013	<1	<1	0.1	0.1	0.2	0.2	4.4	4.4	13.4	13.4	<1	<1	<1	<1
	21 Nov 2022	3	997	′ <1	<1	1.8	1.8	0.3	0.3		4	16.5	16.5	<1	<1	<1	<1
	08 Dec 2022	0	1012	<1	<1	0.1	0.1	0.5	0.5	0.3	0.3	21.3	21.3	3 <1	<1	<1	<1
	19 Dec 2022	12	1002	<1	<1	2.2	2	0.3	0.3	3.3	3.3	20.1	20.1	<1	<1	<1	<1
WS05-A (1)																	П
	27 Oct 2022	13	1013	<1	<1	0.1	0.1	0.2	0.2	9.8	9.8	8.1	8.1	<1	<1	<1	<1
	21 Nov 2022	3	998	<1	<1	-0.	-0.1	0.3	0.3	3.0	0.8	19.3	19.3	<1	<1		
	08 Dec 2022	1	1011	<1	<1	0.1	0.1	0.4	1 0.4	7.8	3.8	19.2	20.1	<1	<1	<1	<1
	19 Dec 2022	12	1001	<1	<1	-1.1	-1.1	0.6	0.6	4.6	4.6	18.8	18.8	S <1	<1	<1	<1
WS06-A (1)																	
	27 Oct 2022	13	1013	<1	<1	0.1	0.1	0.2	0.2	9.8	9.8	8.1	8.1	<1	<1	<1	<1
	21 Nov 2022	3	998	<1	<1	0.1	<0.1	0.7	7 0.7	9.7	6.9	8.6	11.3	3 <1	<1	<1	<1
	08 Dec 2022	1	1011	<1	<1	2.8	2.8	0.3	0.3	3.2	3.2	19.7	19.7	′ <1	<1	<1	<1
	19 Dec 2022	12	1002	<1	<1	<0.1	<0.1	0.5	0.5	3.3	1.1	20.1	20.6	<1	<1	<1	<1



APPENDIX D GEOTECHNICAL LABORATORY TEST RESULTS

BH02-E, WS02-W, WS03-E, WS07-A, WS08-A soil results	GEO / 36622
WS01-W, WS05-A, WS06-A soil results	GEO / 36715
BH02-E rock results	GEO / 36716
BH01-W soil results	GEO / 36980
BH01-W rock results	GEO / 36981
WS04-E, WS09-C soil results	GEO / 37155
Certificate of Analysis – Chemical Tests (pH and Sulphate	22100924
Contents)	22101573
	22121504

			Samp	ole details	C	Classi	ficatio	n Tes	sts	Densit	y Tests	U	ndrained Tr	riaxial Com	pression	Ch	emical Te	ests	
Location	Depth (m)	Sample Ref	Туре	Description	WC	LL %	PL %	PI %	<425 μm	Bulk Mg/m³	Dry Mg/m³	Condition	Cell Pressure kPa	Deviator Stress kPa	Shear Stress kPa	pН	2:1 W/S SO4 g/L	W/S Mg mg/L	Other tests and comments
BH02-E	1.80-2.00	6	В	Brownish grey slightly clayey slightly gravelly silty SAND. Gravel is fine to medium.															Particle Size Distribution
BH02-E	2.80-3.00	8	В	Dark brown silty CLAY.	32.3	36	20	16	100										
BH02-E	3.80-4.00	11	В	Brown slity sand with CLAY															Compaction
BH02-E	4.00-4.45	12	D	Brown and grey silty CLAY.	15.2	34	19	15	81										
WS02-W	1.20	5	D	Dark brown slightly organic silty CLAY.	77.8														
WS02-W	2.20	10	D	Brown and greyish brown clayey SAND.	26.0		NP		100										
WS02-W	3.40	14	D	Dark brown slightly clayey silty fine to medium SAND.															Particle Size Distribution
WS02-W	3.80	15	D	Dark brown clayey SILT.															Particle Size Distribution
WS02-W	4.80	18	D	Dark brown slightly sandy silty CLAY.	29.1	48	23	25	100										
WS03-E	0.90	4	D	Brown slightly clayey sandy silty GRAVEL with occasional brick, iron and rare roots.															Particle Size Distribution

Sample type: B (Bulk disturb.) BLK (Block) C (Core) D (Disturbed) LB (Large Bulk dist.) U (Undisturbed)

NP=Non Plastic

Checked and Approved by

Project Number:

GEO / 36622

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-1 **GEOLABS**

			Samp	ole details	C	Classi	ificatio	n Tes	ts	Densit	y Tests	U	ndrained T	riaxial Com	pression	Ch	emical Te	ests	
Location	Depth (m)	Sample Ref	Туре	Description	WC	LL %	PL %	PI %	<425 μm %	Bulk Mg/m³	Dry Mg/m³	Condition	Cell Pressure kPa	Deviator Stress kPa	Shear Stress kPa	рН	2:1 W/S SO4 g/L	W/S Mg mg/L	Other tests and comments
WS03-E	1.30	7	D	Multi-coloured slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine to medium.	19.6	42	21	21	98										
WS03-E	1.50-1.95	8	В	Brown slightly fine sandy clayey SILT.															Particle Size Distribution Compaction
WS03-E	2.50	11	D	Light grey mottled reddish brown silty CLAY with rare mudstone.	12.2	35	20	15	99										
WS03-E	2.80	13	D	Reddish brown mottled grey slightly gravelly silty CLAY. Gravel is fine.	12.6	37	24	13	99										
WS07-A	1.00-1.20	5	В	Brown silty SAND.															Particle Size Distribution Compaction
WS07-A	2.00	8	D	Brown mottled greyish brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine to medium.	29.5	30	22	8.0	77										
WS07-A	2.20	10	D	Brown silty CLAY.	26.7	46	23	23	100										
WS07-A	3.20	14	D	Greyish brown silty CLAY.	22.0	27	18	9.0	100										
WS07-A	4.00	17	D	Grey mottled reddish brown slightly gravelly silty CLAY. Gravel is fine to medium.	13.1	28	19	9.0	84										
WS08-A	2.00	8	D	Reddish brown and grey silty CLAY.	25.3	50	24	26	100										

Sample type: B (Bulk disturb.) BLK (Block) C (Core) D (Disturbed) LB (Large Bulk dist.) U (Undisturbed)

NP=Non Plastic

Checked and Approved	l by
1//11/2022	

Project Number:

GEO / 36622

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-1 **GEOLABS**

			Samp	ole details		Classi	ficatio	n Tes	sts	Densit	y Tests	U	ndrained T	riaxial Com	pression	Ch	emical Te	ests	
Location	Depth (m)	Sample Ref	Туре	Description	WC	LL %	PL %	PI %	μm	Bulk Mg/m³	Dry Mg/m³	Condition	Cell Pressure kPa	Deviator Stress kPa	Shear Stress kPa	pН	2:1 W/S SO4 g/L	W/S Mg mg/L	Other tests and comments
WS08-A	2.80	13	D	Brown and brownish grey silty CLAY.	17.0	39	20	19	100										

Sample type: B (Bulk disturb.) BLK (Block) C (Core) D (Disturbed) LB (Large Bulk dist.) U (Undisturbed)

NP=Non Plastic

	Checked and Approved by
Į	

Project Number:

GEO / 36622

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-1 GEOLABS ®

BS EN ISO 17892-12: 2018

SUMMARY OF LIQUID AND PLASTIC LIMIT TESTS

Location	Depth m	Sample Ref	Sample Type	Description	Water Content BS EN ISO 17892-1 : 2014	% Liquid Limit	% Plastic Limit	% Plasticity Index	% Percentage Passing 425μm	Atterberg Classification	Test Type	Sample Condition
BH02-E	2.80-3.00	8	В	Dark brown silty CLAY.	32.3	36	20	16	100	CI	2	1
ВН02-Е	4.00-4.45	12	D	Brown and grey silty CLAY.	15.2	34	19	15	81	CL	2	3
WS02-W	1.20	5	D	Dark brown slightly organic silty CLAY.	77.8	~	~	~	~	~	~	~
WS02-W	2.20	10	D	Brown and greyish brown clayey SAND.	26.0	~	NP		100	~	3	1
WS02-W	4.80	18	D	Dark brown slightly sandy silty CLAY.	29.1	48	23	25	100	CI	2	1
WS03-E	1.30	7	D	Multi-coloured slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine to medium.	19.6	42	21	21	98	CI	2	1
WS03-E	2.50	11	D	Light grey mottled reddish brown silty CLAY with rare mudstone.	12.2	35	20	15	99	CL	2	1
WS03-E	2.80	13	D	Reddish brown mottled grey slightly gravelly silty CLAY. Gravel is fine.	12.6	37	24	13	99	MI	2	1
WS07-A	2.00	8	D	Brown mottled greyish brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine to medium.	29.5	30	22	8	77	CL	2	3
WS07-A	2.20	10	D	Brown silty CLAY.	26.7	46	23	23	100	CI	2	1
WS07-A	3.20	14	D	Greyish brown silty CLAY.	22.0	27	18	9	100	CL	2	1
WS07-A	4.00	17	D	Grey mottled reddish brown slightly gravelly silty CLAY. Gravel is fine to medium.	13.1	28	19	9	84	CL	2	3
WS08-A	2.00	8	D	Reddish brown and grey silty CLAY.	25.3	50	24	26	100	CI	2	1
WS08-A	2.80	13	D	Brown and brownish grey silty CLAY.	17.0	39	20	19	100	CI	2	1
Tost Typo:					nlo conditi							

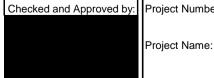
Test Type:

- 1 1 point 80g / 30° fall cone method.
- 2 4 point 80g / 30° fall cone method.

3 - Non plastic determination.

Sample condition:

- 1 As Received
- 2 Air Dried
- 3 Washed & Air Dried



17/11/2022

Project Number:

GEO / 36622

CROWLE FLOOD ALLEVIATION GI F2033-22-1



GL Version 69.211021-1115

Test Report By GEOLABS Limited

Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

Page 1 of 1

Location BH02-E Sample Ref 1.80-2.00 Depth (m) Sample Type

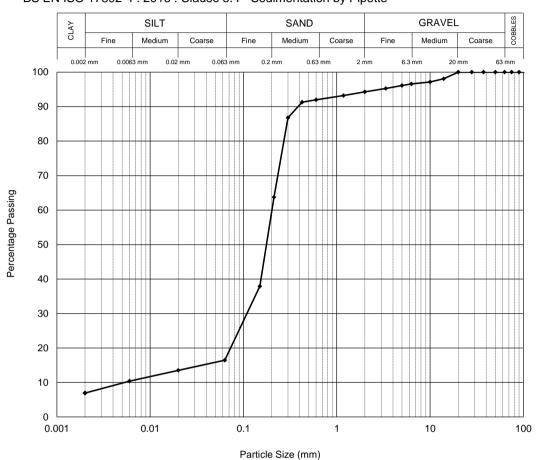
1262 - PSD BH02-E 01.80 6 B Test WS PP - 36622-460055.XLSM

Description

Brownish grey slightly clayey slightly gravelly silty SAND. Gravel is fine to medium.

BS EN ISO 17892-4: 2016: Clause 5.2 - Wet Sieve BS EN ISO 17892-4: 2016: Clause 5.4 - Sedimentation by Pipette

Siev	'e
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	100
20.0 mm	100
14.0 mm	98
10.0 mm	97
6.30 mm	97
5.00 mm	96
3.35 mm	95
2.00 mm	94
1.18 mm	93
600 µm	92
425 µm	91
300 µm	87
212 µm	64
150 µm	38
63 µm	16



Sedimentation									
No Pre-treatment used									
Temp (°C)	25.0								
Size	% Pass								
20 µm	13								
6 µm	10								
2 µm	7								

Particle Proportions	
Cobbles	0.0
Gravel	5.7
Sand	77.9
Silt	9.5
Clay	6.9

Tested by AW Checked and Approved by

GL Version 114.220920-1262

Particle Density 2.70(A) Mg/m³

Project Number:

GEO / 36622

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-1





BS EN ISO 17892-4: 2016

PARTICLE SIZE DISTRIBUTION

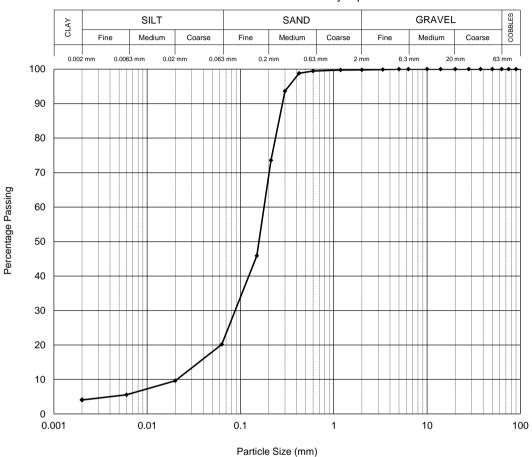
Location WS02-W Sample Ref 14 Depth (m) 3.40 Sample Type D

Description

Dark brown slightly clayey silty fine to medium SAND.

BS EN ISO 17892-4: 2016: Clause 5.2 - Wet Sieve BS EN ISO 17892-4: 2016: Clause 5.4 - Sedimentation by Pipette

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	100
20.0 mm	100
14.0 mm	100
10.0 mm	100
6.30 mm	100
5.00 mm	100
3.35 mm	100
2.00 mm	100
1.18 mm	100
600 µm	99
425 µm	99
300 µm	94
212 µm	74
150 µm	46
63 µm	20



Sedimentation		
No Pre-treatment used		
Temp (°C)	25.0	
Size	% Pass	
20 µm	10	
6 µm	6	
2 µm	4	

Particle Proportions	
Cobbles	0.0
Gravel	0.2
Sand	79.7
Silt	16.1
Clay	4.0

Tested by AW Checked and Approved by

GL Version 114.220920-1262

Particle Density 2.70(A) Mg/m³

Project Number:

GEO / 36622 Project Name:

> **CROWLE FLOOD ALLEVIATION GI** F2033-22-1

Test Report By GEOLABS Limited Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

Client: SOCOTEC UK Ltd, Geotechnical House, Unit 18 & 19 Drome Road, Deeside Industrial Park, Flintshire, CH5 2NY



1262 - PSD WS02-W 03.80 15 D Test WS PP - 36622-460066.XLSM

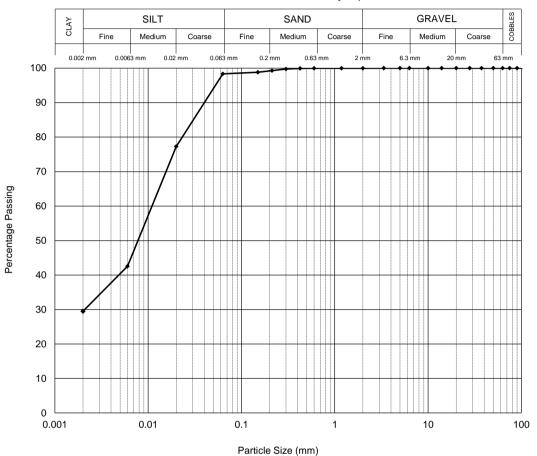
Location Sample Ref Depth (m) Sample Type WS02-W 15 3.80 D

Description

Dark brown clayey SILT.

BS EN ISO 17892-4: 2016: Clause 5.2 - Wet Sieve BS EN ISO 17892-4: 2016: Clause 5.4 - Sedimentation by Pipette

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	100
20.0 mm	100
14.0 mm	100
10.0 mm	100
6.30 mm	100
5.00 mm	100
3.35 mm	100
2.00 mm	100
1.18 mm	100
600 µm	100
425 µm	100
300 µm	100
212 µm	99
150 µm	99
63 µm	98



Sedimentation		
No Pre-treatment used		
Temp (°C)	25.0	
Size	% Pass	
20 µm	77	
6 µm	43	
2 µm	29	

Particle Density 2.70(A) Mg/m³

Particle Proportions	
Cobbles	0.0
Gravel	0.0
Sand	1.6
Silt	68.9
Clay	29.5

GL Version 114.220920-1262 Tested by AW Checked and Approved by

Project Number:

GEO / 36622

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-1

Test Report By GEOLABS Limited

Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX



GEOLABS

Location WS03-E Sample Ref 0.90 Depth (m) Sample Type D

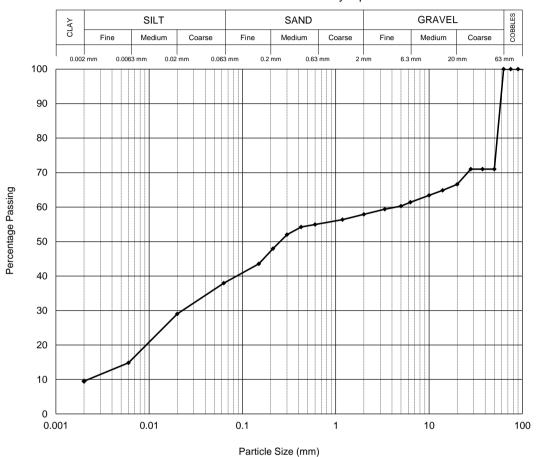
1262 - PSD WS03-E 00.90 4 D Test WS PP - 36622-460062.XLSM

Description

Brown slightly clayey sandy silty GRAVEL with occasional brick, iron and rare roots.

BS EN ISO 17892-4: 2016: Clause 5.2 - Wet Sieve BS EN ISO 17892-4: 2016: Clause 5.4 - Sedimentation by Pipette

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	71
37.5 mm	71
28.0 mm	71
20.0 mm	67
14.0 mm	65
10.0 mm	63
6.30 mm	61
5.00 mm	60
3.35 mm	59
2.00 mm	58
1.18 mm	56
600 µm	55
425 µm	54
300 µm	52
212 µm	48
150 µm	44
63 µm	38



Sedimentation	
No Pre-treatment used	
Temp (°C)	25.0
Size	% Pass
20 μm	29
6 µm	15
2 µm	9

Particle Proportions	
Cobbles	0.0
Gravel	42.1
Sand	19.9
Silt	28.5
Clay	9.5

Tested by AW Checked and Approved by

GL Version 114.220920-1262

Particle Density 2.70(A) Mg/m³

Project Number:

Project Name:

GEO / 36622

CROWLE FLOOD ALLEVIATION GI F2033-22-1

Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX



Location WS03-E Sample Ref 8

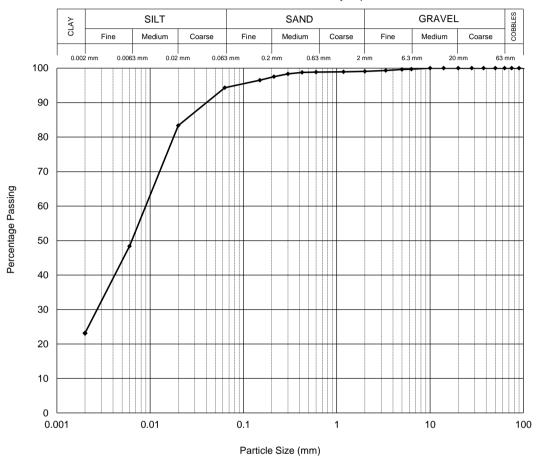
1262 - PSD WS03-E 01.50 8 B Test WS PP - 36622-460052.XLSM

Depth (m) 1.50-1.95 Sample Type B Description

Brown slightly fine sandy clayey SILT.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve BS EN ISO 17892-4 : 2016 : Clause 5.4 - Sedimentation by Pipette

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	100
20.0 mm	100
14.0 mm	100
10.0 mm	100
6.30 mm	100
5.00 mm	100
3.35 mm	99
2.00 mm	99
1.18 mm	99
600 µm	99
425 µm	99
300 µm	98
212 µm	98
150 µm	97
63 µm	94



Sedimentation	
No Pre-treatment used	
Temp (°C)	25.0
Size	% Pass
20 µm	83
6 µm	48
2 µm	23

Particle Proportions						
Cobbles	0.0					
Gravel	0.9					
Sand	4.7					
Silt	71.2					
Clay	23.2					

Tested by AW
Checked and Approved by

GL Version 114.220920-1262

Particle Density 2.70(A) Mg/m³

Project Number:

Project Name:

GEO / 36622

CROWLE FLOOD ALLEVIATION GI F2033-22-1

F2033Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX



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Test Report By GEOLABS Limited Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

Client: SOCOTEC UK Ltd, Geotechnical House, Unit 18 & 19 Drome Road, Deeside Industrial Park, Flintshire, CH5 2NY

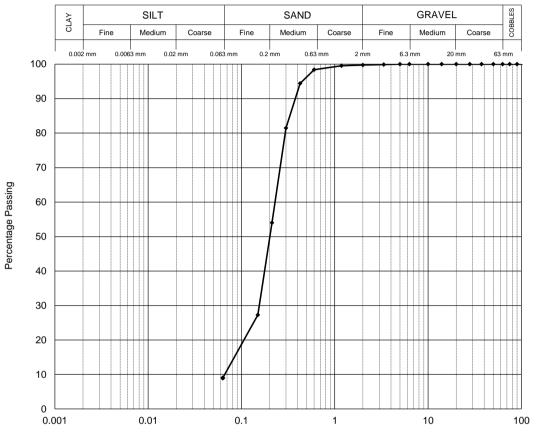
Location WS07-A Sample Ref 5 1.00-1.20 Depth (m) Sample Type

1262 - PSD WS07-A 01.00 5 B Test WS - 36622-460056.XLSM

Description Brown silty SAND.

BS EN ISO 17892-4: 2016: Clause 5.2 - Wet Sieve

Siev	е
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	100
20.0 mm	100
14.0 mm	100
10.0 mm	100
6.30 mm	100
5.00 mm	100
3.35 mm	100
2.00 mm	100
1.18 mm	100
600 µm	98
425 µm	94
300 µm	81
212 µm	54
150 µm	27
63 µm	9



Particle Size (mm)

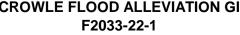
Particle Proportions					
Cobbles	0.0				
Gravel	0.3				
Sand	90.8				
Silt & Clay	8.9				

Project Number:

GEO / 36622

Project Name:

CROWLE FLOOD ALLEVIATION GI





Test Report By GEOLABS Limited

Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

(Ref 1668672726)

MOISTURE CONTENT / DRY DENSITY RELATIONSHIP

BH02-E Location Sample Ref Depth (m)

Description:

Brown clayey silty SAND

medium-gravel size

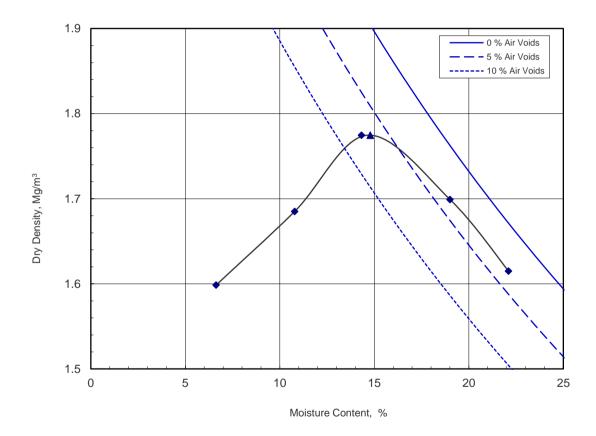
3.80-4.00 Sample Type

1410 - Comp BH02-E 03.80 11 B Test 01 - 36622-460053.XLSM

Preparation Oven dried 2.5kg Rammer for soils with particles up to Test Method

Samples Used Single Mass Retained on 37.5 mm Sieve % 0 Mass Retained on 20.0 mm Sieve % 0 Particle Density - Assumed 2.65 Mg/m³

Mg/m³ 1.77 Maximum Dry Density **Optimum Moisture Content** % 14.8



Determination		1	2	3	4	5
Moisture Content	%	6.6	10.8	14.3	19.0	22.1
Dry Density	Mg/m³	1.60	1.69	1.77	1.70	1.62

Project Number:

GEO / 36622

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-1



Test Report By GEOLABS Limited

Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX Client: SOCOTEC UK Ltd, Geotechnical House, Unit 18 & 19 Drome Road, Deeside Industrial Park, Flintshire, CH5 2NY

MOISTURE CONTENT / DRY DENSITY RELATIONSHIP

WS03-E Location Sample Ref Depth (m) 1.50-1.95

Sample Type

1410 - Comp WS03-E 01.50 8 B Test 01 - 36622-460052.XLSM

Description:

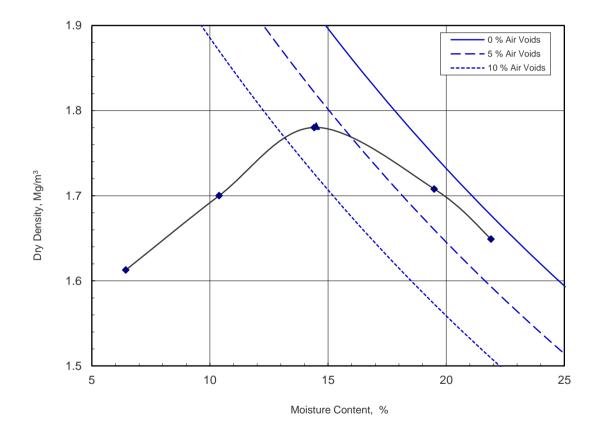
Brown slightly fine sandy clayey SILT.

Preparation Oven dried

2.5kg Rammer for soils with particles up to Test Method medium-gravel size

Samples Used Single Mass Retained on 37.5 mm Sieve % 0 Mass Retained on 20.0 mm Sieve % 0 Particle Density - Assumed 2.65 Mg/m³

Maximum Dry Density Mg/m³ 1.78 **Optimum Moisture Content** % 14.5



Determination		1	2	3	4	5
Moisture Content	%	6.4	10.4	14.4	19.5	21.9
Dry Density Mg	g/m³	1.61	1.70	1.78	1.71	1.65

Tested by AD Checked and Approved by

Project Number:

GEO / 36622

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-1



Version 50.210517-1410

WS07-A Location Sample Ref 1.00-1.20 Description:

Brown silty SAND.

Depth (m) Sample Type

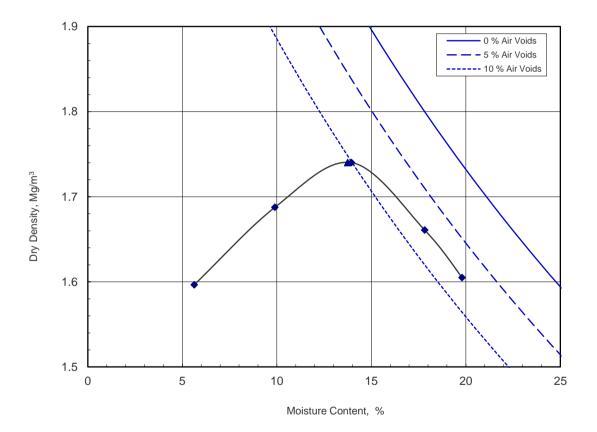
1410 - Comp WS07-A 01.00 5 B Test 01 - 36622-460056.XLSM

Preparation Oven dried

2.5kg Rammer for soils with particles up to Test Method medium-gravel size

Samples Used Single Mass Retained on 37.5 mm Sieve % 0 Mass Retained on 20.0 mm Sieve % 0 Particle Density - Assumed Mg/m³ 2.65

Mg/m³ Maximum Dry Density 1.74 **Optimum Moisture Content** % 13.8



Determination		1	2	3	4	5
Moisture Content	%	5.6	9.9	14.0	17.8	19.8
Dry Density N	/lg/m³	1.60	1.69	1.74	1.66	1.61

Tested by AD Checked and Approved by

Project Number:

GEO / 36622

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-1



Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

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GEOLABS

Client	SOCOTEC UK Ltd	
Project No.	36622	TEST RESTRICTION
Project Name	CROWLE FLOOD ALLEVIATION GI	

The following tests have been scheduled on the above project and **CANNOT** be performed for the reason stated. If alternative samples are available for the restricted tests, please supply details.

	1								I		
Laboratory ID	BH / TP No.	Sample Ref.	De (r	epth m)	Туре		Test(s) Schedule	d	Reason for Restriction	Description	
									Insufficent sample to test	Dark brown slightly organic silty CLA	·Υ.
460067	WS02-W	5	1.20		D	PI					
Comments / r	remarks									Test restriction raised by	
Ref. WS 04 - Ti	FRF - Issue 1B	(12/18)									
1101. VV 0 0-7 - 11	LINE - ISSUE ID	(12/10)									

Restriction - 36622 01.XLSX 17/11/2022 BS EN ISO 17892-12: 2018

SUMMARY OF LIQUID AND PLASTIC LIMIT TESTS

,												
Location	Depth m	Sample Ref	Sample Type	Description	Water Content BS EN ISO 17892-1 : 2014	% Liquid Limit	% Plastic Limit	% Plasticity Index	% Percentage Passing 425µm	Atterberg Classification	Test Type	Sample Condition
WS01-W	5.10	13	D	Greyish brown silty CLAY.	30.3	29	20	9	100	CL	2	1
WS05-A	3.65	11	D	Greyish brown and grey mottled gravelly silty CLAY. Gravel is fine to medium.	18.6	25	18	7	73	CL	2	3
WS05-A	4.40	15	D	Brown mottled light grey silty CLAY.	18.4	38	20	18	100	CI	2	1
WS06-A	2.80	8	D	Black and dark brown pseudo-fibrous PEAT.	239	~	NP		99	~	3	1
WS06-A	3.70	12	D	Grey silty CLAY.	26.1	28	17	11	100	CL	2	1
WS06-A	4.80	15	D	Brown silty CLAY.	20.9	35	21	14	100	CL	2	1
Test Type:				Sam	ple conditi	on:						

- 1 1 point 80g / 30° fall cone method.
- 2 4 point 80g / 30° fall cone method.

3 - Non plastic determination.

1 - As Received 2 - Air Dried

3 - Washed & Air Dried

Checked and Approved by:

Project Number:

GEO / 36715

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-2



Test Report By GEOLABS Limited

Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

(Ref 1668608928)

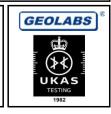
Client: SOCOTEC UK Ltd, Geotechnical House, Unit 18 & 19 Drome Road, Deeside Industrial Park, Flintshire, CH5 2NY

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK MATERIALS

		Sa	mple details			Der	nsity	Uni	axial Com	pressio	n Test (L				mpression frame used)
Borehole Ref.	Sample Ref.	Depth (m)	Description	MC (%)	Degree of Saturation (%)	Bulk (Mg/m³)	Dry (Mg/m³)	Mean af Diameter (mm)		H/D Ratio	Load at Failure (kN)	UCS (MPa) 3 sig. fig.	Failure Sketch	D. Tested	Remarks
BH02-E	115	8.74-8.98	Extremely weak, thinly laminated, greenish grey MUDSTONE. Highly to completely weathered.	11	86.1	2.36	2.14	86.70	202.80	2.3	2.4	0.407		01/11/22	
Note: The dime	ensional requireme	nts of flatness	(<0.02 mm), perpendicularity (<0.05 / 50 mm) and straightne	ess (0.3 m	m deviation)	are all met	Specific G	ravity used for	or Degree o	f Saturat	ion is assu	med unle	ss specif	fied by t	the client.

Note: The dimensional requirements of flatness (<0.02 mm), perpendicularity (<0.05 / 50 mm) and straightness (0.3 mm deviation) are all met. Specific Gravity used for Degree of Saturation is assumed unless specified by the client.

Checked and Approved by	Project Number:
	GEO / 36716 Project Name:
	CROWLE FLOOD ALLEVIATION GI
Date: 08/11/2022	F2033-22-3



ISRM Suggested Methods - Rock Characterization Testing and Monitoring 1974 - 2006

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK MATERIALS

Borehole Ref.: BH02-E Sample Ref.: 115 Depth (m): 8.74-8.98 Description:

Extremely weak, thinly laminated, greenish grey MUDSTONE. Highly to

completely weathered.

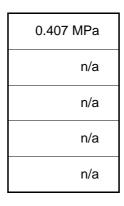
Diameter	
Height	
Bulk Density	
Dry Density	
Water Content	

86.70 mm 202.80 mm 2.36 Mg/m³ 2.14 Mg/m³ 11 %

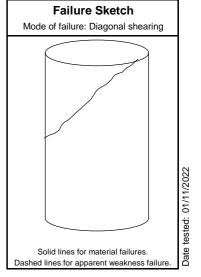
Degree of Saturation: 86.1 % Specific Gravity: 2.9 Mg/m³ (Assumed)

Test results

Unconfined Compressive Strength
Young's Modulus
(tangential at 50% failure load)
Poisson's Ratio
(tangential at 50% failure load)
Young's Modulus
(secant at 10% failure load)
Poisson's Ratio
(secant at 10% failure load)



LF0879C (1000kN) compression frame used



Angle of foliation/Axis of loading: n/a
Angle of shear plane/Axis of loading: n/a

Sample type C

 $Note: The \ dimensional \ requirements \ of \ Flatness \ (<0.02\ mm), \ Perpendicularity \ (<0.05\ /\ 50\ mm) \ and \ Straightness \ (0.3\ mm) \ are \ all \ met.$

Checked and Approved by

Project Number:

Project Name:

GEO / 36716

CROWLE FLOOD ALLEVIATION GI F2033-22-3



Date: 08/11/2022

ISRM Suggested Methods - Rock Characterization Testing and Monitoring 1974 - 2006

DETERMINATION OF THE WATER CONTENT OF A ROCK SAMPLE

			Sample details	Test r	esults	
Borehole Ref.	Sample Ref.	Depth (m)	Description Water Contents (%)		Oven Temp. (°C)	Remarks
BH02-E	123	10.05-10.10	05-10.10 Weak, light reddish brown MUDSTONE/SILTSTONE. Moderately weathered. 2.		105°	
BH02-E	124	10.42-10.47	.10.47 Weak, thinly laminated, light reddish brown MUDSTONE/SILTSTONE. Moderately weathered.		105°	
BH02-E	125	10.47-10.55	0.47-10.55 Weak, thinly laminated, light reddish brown MUDSTONE/SILTSTONE. Moderately weathered.		105°	
BH02-E	126	10.69-10.81	10.69-10.81 Weak, thinly laminated, grey MUDSTONE/SILTSTONE. Moderately weathered.		105°	
BH02-E	127	10.94-11.00	Weak, thinly laminated, grey MUDSTONE/SILTSTONE. Moderately weathered.	4.7	105°	
BH02-E	128	11.09-11.17	Weak, thinly laminated, greenish grey MUDSTONE/SILTSTONE. Moderately weathered.	7.6	105°	
BH02-E	129	11.26-11.36	Weak, thinly laminated, greenish grey MUDSTONE/SILTSTONE. Moderately weathered.	11.4	105°	
BH02-E	02-E 130 11.50-11.60 Strong, white GYPSUM. Fresh.		Strong, white GYPSUM. Fresh.	1.6	105°	
BH02-E	BH02-E 131 11.67-11.72 Weak, thinly laminated, light reddish brown MUDSTONE/SILTSTONE. Moderately weathered.		7.6	105°		
ВН02-Е	132 Weak, thinly laminated, light reddish brown MUDSTONE/SILTSTONE. Moderately weathered.		8.7	105°		

Note: Water Content in a rock sample as received

Checked and Approved by

Project Number:

GEO / 36716

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-3



Date:

08/11/2022

ISRM Suggested Methods – Rock Characterization Testing and Monitoring 1974 - 2006

DETERMINATION OF THE WATER CONTENT OF A ROCK SAMPLE

			Sample details	Test r	esults	
Borehole Ref.	Sample Ref.	Depth (m)	Depth (m) Description Wat Cont (%		Oven Temp. (°C)	Remarks
BH02-E	133	12.30-12.40	0-12.40 Weak, light reddish brown MUDSTONE/SILTSTONE. Moderately weathered. 6		105°	
BH02-E	134	12.65-12.72	Weak, light reddish brown MUDSTONE/SILTSTONE. Moderately weathered.	7.2	105°	
BH02-E	135	12.87-12.95	.87-12.95 Weak, light reddish brown MUDSTONE/SILTSTONE. Moderately weathered. 9		105°	
BH02-E	136	136 12.95-13.04 Weak, light reddish brown MUDSTONE/SILTSTONE. Moderately weathered.		9.3	105°	
BH02-E	137	13.30-13.40	.30-13.40 Strong, white GYPSUM. Fresh.		105°	
BH02-E	138	13.50-13.57	Weak, thinly laminated, reddish brown MUDSTONE/SILTSTONE. Moderately weathered.	8.3	105°	
BH02-E	139	13.60-13.70	Weak, thinly laminated, reddish brown MUDSTONE/SILTSTONE. Moderately weathered.	8.4	105°	
BH02-E	140	13.70-13.78	Weak, thinly laminated, reddish brown MUDSTONE/SILTSTONE. Moderately weathered.	8.2	105°	
BH02-E	BH02-E 141 13.83-13.89 Weak, thinly laminated, reddish brown MUDSTONE/SILTSTONE. Moderately weathered.		8.3	105°		
BH02-E	BH02-E 142 13.92-14.00 Weak, thinly laminated, reddish brown MUDSTONE/SILTSTONE. Moderately weathered.		3.9	105°		

Note: Water Content in a rock sample as received

Checked and Approved by

Project Number:

GEO / 36716

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-3 UKAS
TESTING
1982

Test Report By GEOLABS Limited

08/11/2022

Date:

DETERMINATION OF THE WATER CONTENT OF A ROCK SAMPLE

			Sample details	Test r	esults	
Borehole Ref.	Sample Ref.	Depth (m)	Description Wat Cont (%		Oven Temp. (°C)	Remarks
BH02-E	143	14.07-14.13	14.07-14.13 Weak, thinly laminated, reddish brown MUDSTONE/SILTSTONE. Moderately weathered.		105°	
BH02-E	144	14.31-14.41	Weak, thinly laminated, reddish brown MUDSTONE/SILTSTONE. Moderately weathered.	4.2	105°	
BH02-E	145	14.41-14.52	Weak, thinly laminated, reddish brown MUDSTONE/SILTSTONE. Moderately weathered.	6.9	105°	
ВН02-Е	146	14.68-14.73	Weak, thinly laminated, reddish brown MUDSTONE/SILTSTONE. Moderately weathered.	5.1	105°	
ВН02-Е	147	14.91-14.99	Strong, white GYPSUM. Fresh.	3.3	105°	
ВН02-Е	148	15.36-15.41	Weak, thinly laminated, reddish brown MUDSTONE/SILTSTONE. Moderately weathered.	6.5	105°	
ВН02-Е	173	15.55-15.61	Weak, thinly laminated, grey MUDSTONE/SILTSTONE. Moderately weathered.	7.4	105°	
ВН02-Е	149	15.63-15.67	Weak, thinly laminated, grey MUDSTONE/SILTSTONE. Moderately weathered.	6.6	105°	
ВН02-Е	150	15.74-15.82	Weak, thinly laminated, reddish brown MUDSTONE/SILTSTONE. Moderately weathered.	7.1	105°	
BH02-E	151	15.82-15.87	Weak, thinly laminated, grey MUDSTONE/SILTSTONE. Moderately weathered.	9.5	105°	

Note: Water Content in a rock sample as received

Checked and Approved by

Project Number:

GEO / 36716

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-3



Date: 08

08/11/2022

ISRM Suggested Methods - Rock Characterization Testing and Monitoring 1974 - 2006

DETERMINATION OF THE WATER CONTENT OF A ROCK SAMPLE

			Sample details	Test	esults		
Borehole Ref.	Sample Ref.	Depth (m)	Description	Water Content (%)	Oven Temp. (°C)	Remarks	
BH02-E	152	16.14-16.21	Weak, thinly laminated, grey METAMORPHIC ROCK. Slightly to moderately weathered.	5.1	105°		
BH02-E	153	16.31-16.36	Weak, thinly laminated, reddish brown MUDSTONE/SILTSTONE. Moderately weathered.	7.0	105°		
BH02-E	154	16.46-16.52	Weak, thinly laminated, reddish brown MUDSTONE/SILTSTONE. Moderately weathered.	6.6	105°		
BH02-E	3H02-E 155 16.57-16.62		155 16.57-16.62 Weak, thinly laminated, reddish brown MUDSTONE/SILTSTONE. Moderately weathered.		10.2	105°	
BH02-E	156	16.95-17.00	Weak, thinly laminated, reddish brown MUDSTONE/SILTSTONE. Moderately weathered.	7.9	105°		
BH02-E	157	17.05-17.08	Weak, thinly laminated, reddish brown MUDSTONE/SILTSTONE. Moderately weathered.	7.1	105°		
BH02-E	158	17.08-17.15	Weak, thinly laminated, reddish brown MUDSTONE/SILTSTONE. Moderately weathered.	3.9	105°		
BH02-E	159	17.47-17.53	Weak, thinly laminated, reddish brown MUDSTONE/SILTSTONE. Moderately weathered.	4.4	105°		
BH02-E	BH02-E 160 17.69-17		Weak, thinly laminated, reddish brown METAMORPHIC ROCK. Slightly to moderately weathered.	3.5	105°		
BH02-E	BH02-E 161 18.02-18.11 Weak, thinly laminated, reddish brown METAMORPHIC ROCK. Slig weathered.		Weak, thinly laminated, reddish brown METAMORPHIC ROCK. Slightly to moderately weathered.	3.4	105°		

Note: Water Content in a rock sample as received

Checked and Approved by

Project Number:

GEO / 36716

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-3

GEOLABS

Date:

08/11/2022

ISRM Suggested Methods - Rock Characterization Testing and Monitoring 1974 - 2006

DETERMINATION OF THE WATER CONTENT OF A ROCK SAMPLE

			Sample details	Test r	esults	
Borehole Ref.	Sample Ref.	Depth (m)	Description	Water Content (%)	Oven Temp. (°C)	Remarks
BH02-E	162	18.28-18.33	Strong, thinly laminated, grey MUDSTONE/SILTSTONE. Moderately weathered.		105°	
BH02-E	163	18.54-18.57	Strong, thinly laminated, grey MUDSTONE/SILTSTONE. Moderately weathered. 5.		105°	
BH02-E	02-E 164 18.76-18.81 Strong, thinly laminated, grey MUDSTONE/SILTSTONE. Moderately weathered. 5.0			5.0	105°	
BH02-E	H02-E 165 18.84-18.92 Strong, thinly laminated, grey MUDSTONE/SILTSTONE. Moderately weathered.		5.1	105°		
BH02-E	166 19.01-19.10 Strong, thinly laminated, grey MUDSTONE/SILTSTONE. Moderately weathered.		2.6	105°		
BH02-E	167	19.20-19.29	Strong, grey METAMORPHIC ROCK. Fresh.	2.3	105°	
BH02-E	168	19.29-19.39	Strong, grey METAMORPHIC ROCK. Fresh.	4.2	105°	
ВН02-Е	169	19.53-19.62	Strong, grey METAMORPHIC ROCK. Fresh.	4.9	105°	
BH02-E	BH02-E 170 19.62-19.73 Strong, white GYPSUM. Fresh.		1.6	105°		
BH02-E 171 19.80-19.90 Strong, thinly laminated, grey MUDSTONE/SILTSTONE. Moderately weathered.		3.1	105°			

Note: Water Content in a rock sample as received

Checked and Approved by

Project Number:

Project Name:

GEO / 36716

08/11/2022

CROWLE FLOOD ALLEVIATION GI F2033-22-3



Test Report By GEOLABS Limited E

Date:

Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

Client: SOCOTEC UK Ltd. Geotechnical House. Unit 18 & 19 Drome Road. Deeside Industrial Park. Flintshire. CH5 2NY

ISRM Suggested Methods – Rock Characterization Testing and Monitoring 1974 - 2006

DETERMINATION OF THE WATER CONTENT OF A ROCK SAMPLE

			Sample details	Test	esults	
Borehole Ref.	Sample Ref.	Depth (m)	Description	Water Content (%)	Oven Temp. (°C)	Remarks
BH02-E	172	19.90-20.00	Strong, thinly laminated, grey MUDSTONE/SILTSTONE. Moderately weathered.	6.4	105°	
BH02-E	101	5.20-5.25	Strong, white GYPSUM. Fresh.	7.4	105°	
BH02-E	102	5.46-5.50	Strong, thinly laminated, grey MUDSTONE/SILTSTONE. Moderately weathered.	10.3	105°	
BH02-E	E 103 5.87-6.01		Weak, thinly laminated, greenish grey MUDSTONE/SILTSTONE. Highly weathered.	12.5	105°	
BH02-E	104	6.22-6.28	Weak, thinly laminated, greenish grey MUDSTONE/SILTSTONE. Highly weathered.	9.1	105°	
BH02-E	105	6.28-6.36	Strong, thinly laminated, grey MUDSTONE/SILTSTONE. Moderately weathered.	5.5	105°	
BH02-E	106	6.67-6.77	Weak, thinly laminated, reddish brown MUDSTONE/SILTSTONE. Moderately weathered.	5.8	105°	
BH02-E	107	6.72-6.90	Weak, thinly laminated, reddish brown MUDSTONE/SILTSTONE. Moderately weathered.	7.3	105°	
BH02-E	BH02-E 108 7.10-7.21		Strong, light brown METAMORPHIC ROCK. Fresh.	1.8	105°	
BH02-E 109 7.21-7.32		7.21-7.32	Weak, thinly laminated, reddish brown MUDSTONE/SILTSTONE. Moderately weathered.	7.8	105°	

Note: Water Content in a rock sample as received

Checked and Approved by

Project Number:

GEO / 36716

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-3



Date:

08/11/2022

DETERMINATION OF THE WATER CONTENT OF A ROCK SAMPLE

			Sample details	Test r	esults	
Borehole Ref.	Sample Ref.	Depth (m)	Description	Water Content (%)	Oven Temp. (°C)	Remarks
BH02-E	110	7.42-7.51	Weak, thinly laminated, reddish brown MUDSTONE/SILTSTONE. Moderately weathered. 5		105°	
BH02-E	111	7.78-7.86	Weak, thinly laminated, greenish grey MUDSTONE/SILTSTONE. Highly weathered. 5.		105°	
ВН02-Е	112	8.07-8.15	7-8.15 Weak, thinly laminated, greenish grey MUDSTONE/SILTSTONE. Highly weathered. 6.5		105°	
ВН02-Е	113	113 8.30-8.40 Strong, grey METAMORPHIC ROCK. Fresh.		6.8	105°	
BH02-E	114	8.51-8.60	Strong, grey METAMORPHIC ROCK. Fresh.		105°	
ВН02-Е	116	8.98-9.08	Weak, thinly laminated, greenish grey MUDSTONE/SILTSTONE. Highly weathered.	12.5	105°	
ВН02-Е	117	9.15-9.24	Weak, thinly laminated, greenish grey MUDSTONE/SILTSTONE. Highly weathered.	8.7	105°	
ВН02-Е	118	9.33-9.39	Strong, grey METAMORPHIC ROCK. Fresh.	3.1	105°	
BH02-E	2-E 119 9.44-9.47 Strong, grey METAMORPHIC ROCK. Fresh.		3.1	105°		
BH02-E	BH02-E 120 9.56-9.64 Weak, thinly laminated, greenish grey MUDSTONE/SILTSTONE. Highly weathered.		3.8	105°		

Note: Water Content in a rock sample as received

Checked and Approved by

Project Number:

GEO / 36716

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-3



ISRM Suggested Methods - Rock Characterization Testing and Monitoring 1974 - 2006

DETERMINATION OF THE WATER CONTENT OF A ROCK SAMPLE

			Sample details	Test i	results]
Borehole Ref.	Sample Ref.	Depth (m)	Description	Water Content (%)	Oven Temp. (°C)	Remarks
BH02-E	121	9.65-9.74	Weak, thinly laminated, greenish grey MUDSTONE/SILTSTONE. Highly weathered.	5.5	105°	
BH02-E	122	9.88-9.93	Weak, thinly laminated, reddish brown MUDSTONE/SILTSTONE. Moderately weathered.	5.6	105°	

Note: Water Content in a rock sample as received

Checked and Approved by

Project Number:

Project Name:

GEO / 36716

08/11/2022

CROWLE FLOOD ALLEVIATION GI F2033-22-3



Date:

			Samp	ole details	С	Classif	fication	n Tests	3	Densit	y Tests	Ur	ndrained T	riaxial Com	pression	Ch	emical Te	ests	
Location	Depth (m)	Sample Ref	Туре	Description	wc	LL %	PL %	PI %	<425 μm %	Bulk Mg/m³	Dry Mg/m³	Condition	Cell Pressure kPa	Deviator Stress kPa	Shear Stress kPa	рН	2:1 W/S SO4 g/L	W/S Mg mg/L	Other tests and comments
BH01-W	0.50-0.90	6	В	Dark brown sandy gravelly clayey SILT with one cobble.															Particle Size Distribution
BH01-W	2.20-2.70	12	В	Greyish brown clayey silty SAND. Sand is fine.	24.0		NP		100										
BH01-W	3.20-3.70	16	В	Brown slightly sandy silty CLAY.	32.1	34	15	19	100										Particle Size Distribution Compaction
BH01-W	4.20-4.65	18	UT	Firm to Stiff fissured brown silty CLAY.															One Dimensional Consolidation
BH01-W	6.00	22	D	Greyish brown CLAY.	32.0	47	20	27	100										
BH01-W	6.20-6.65	23	UT	Firm to stiff dark brow CLAY.	29.5					2.11	1.63	Undisturbed	120	196	98				
BH01-W	7.20	26	D	Brown and greyish brown mottled silty CLAY.	21.4	42	19	23	100										
BH01-W	9.20-9.65	31	UT	Very stiff brown mottled grey sandy silty CLAY.	13.3	30	20	10	66	2.01	1.77	Undisturbed	180	328	164				

Sample type: B (Bulk disturb.) BLK (Block) C (Core) D (Disturbed) LB (Large Bulk dist.) U (Undisturbed)

NP=Non Plastic

Checked and Approved by

S Burke - Senior Technician
05/01/2023

Project Number:

GEO / 36980

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-4 **GEOLABS**

Test Report By GEOLABS Limited Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

Client: SOCOTEC UK Ltd, Geotechnical House, Unit 18 & 19 Drome Road, Deeside Industrial Park, Flintshire, CH5 2NY

BS EN ISO 17892-4: 2016

PARTICLE SIZE DISTRIBUTION

Location BH01-W Sample Ref

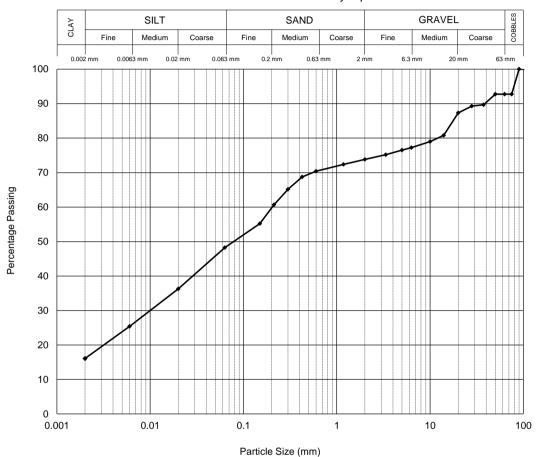
0.50-0.90 Depth (m) Sample Type

Description

Dark brown sandy gravelly clayey SILT with one cobble.

BS EN ISO 17892-4: 2016: Clause 5.2 - Wet Sieve BS EN ISO 17892-4: 2016: Clause 5.4 - Sedimentation by Pipette

Sieve		
Size	% Pass	
200.0 mm	100	
125.0 mm	100	
90.0 mm	100	
75.0 mm	93	
63.0 mm	93	
50.0 mm	93	
37.5 mm	90	
28.0 mm	89	
20.0 mm	87	
14.0 mm	81	
10.0 mm	79	
6.30 mm	77	
5.00 mm	76	
3.35 mm	75	
2.00 mm	74	
1.18 mm	72	
600 µm	70	
425 µm	69	
300 µm	65	
212 µm	61	
150 µm	55	
63 µm	48	



Sedimentation		
No Pre-treatment used		
25.0		
% Pass		
36		
25		
16		

Particle Proportions		
Cobbles	7.3	
Gravel	18.9	
Sand	25.6	
Silt	32.2	
Clay	16.0	

Tested by AW Checked and Approved by

Particle Density 2.70(A) Mg/m³

Project Number:

GEO / 36980

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-4

Test Report By GEOLABS Limited

Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

(Ref 1672916698)

1262 - PSD BH01-W 00.50 6 B Test WS PP - 36980-465695.XLSM

GEOLABS

1262 - PSD BH01-W 03.20 16 B Test WS PP - 36980-465693.XLSM

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4: 2016

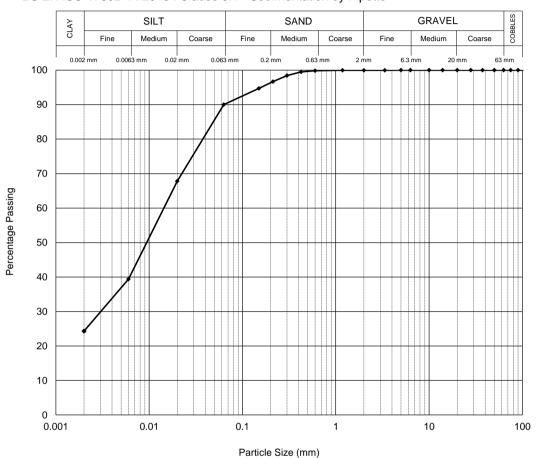
Location BH01-W Sample Ref 16 Depth (m) 3.20-3.70 Sample Type

Description

Brown slightly sandy silty CLAY.

BS EN ISO 17892-4: 2016: Clause 5.2 - Wet Sieve BS EN ISO 17892-4: 2016: Clause 5.4 - Sedimentation by Pipette

Sieve		
Size	% Pass	
200.0 mm	100	
125.0 mm	100	
90.0 mm	100	
75.0 mm	100	
63.0 mm	100	
50.0 mm	100	
37.5 mm	100	
28.0 mm	100	
20.0 mm	100	
14.0 mm	100	
10.0 mm	100	
6.30 mm	100	
5.00 mm	100	
3.35 mm	100	
2.00 mm	100	
1.18 mm	100	
600 µm	100	
425 µm	100	
300 µm	98	
212 µm	97	
150 µm	95	
63 µm	90	



Sedimentation		
No Pre-treatment used		
25.0		
% Pass		
68		
39		
24		

Particle Proportions		
Cobbles	0.0	
Gravel	0.0	
Sand	9.9	
Silt	65.7	
Clay	24.4	

Tested by AW Checked and Approved by

Particle Density 2.70(A) Mg/m³

Project Number:

GEO / 36980

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-4

05/01/2023 Test Report By GEOLABS Limited

Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

(Ref 1672916704)



Client: SOCOTEC UK Ltd, Geotechnical House, Unit 18 & 19 Drome Road, Deeside Industrial Park, Flintshire, CH5 2NY

MOISTURE CONTENT / DRY DENSITY RELATIONSHIP

BH01-W Location Sample Ref 16 Depth (m) 3.20-3.70

16 B Test 01 - 36980-465693.XLSM

1410 - Comp BH01-W 03.20

Description:

Brown slightly sandy silty CLAY.

Sample Type

Preparation

Test Method

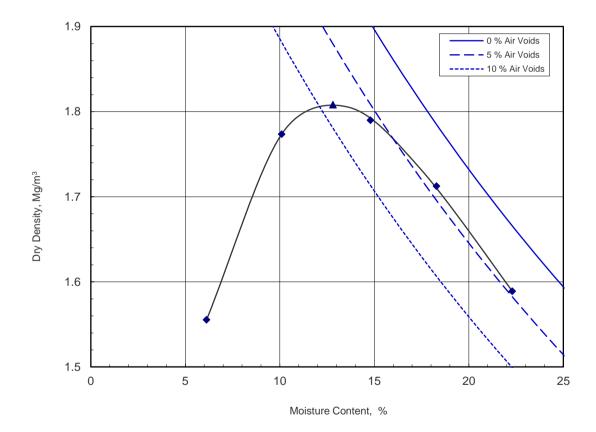
Oven dried

2.5kg Rammer for soils with particles up to

medium-gravel size

Samples Used Single Mass Retained on 37.5 mm Sieve % 0 Mass Retained on 20.0 mm Sieve % 0 Particle Density - Assumed 2.65 Mg/m³

Maximum Dry Density Mg/m³ 1.81 **Optimum Moisture Content** % 12.8



Determination		1	2	3	4	5
Moisture Content	%	6.1	10.1	14.8	18.3	22.3
Dry Density N	lg/m³	1.56	1.77	1.79	1.71	1.59

Tested by AD Checked and Approved by

Project Number:

GEO / 36980

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-4



05/01/2023

Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

Page 1 of 1 (Ref 1672916710)

BS EN ISO 17892-5: 2017

INCREMENTAL LOADING OEDOMETER TEST

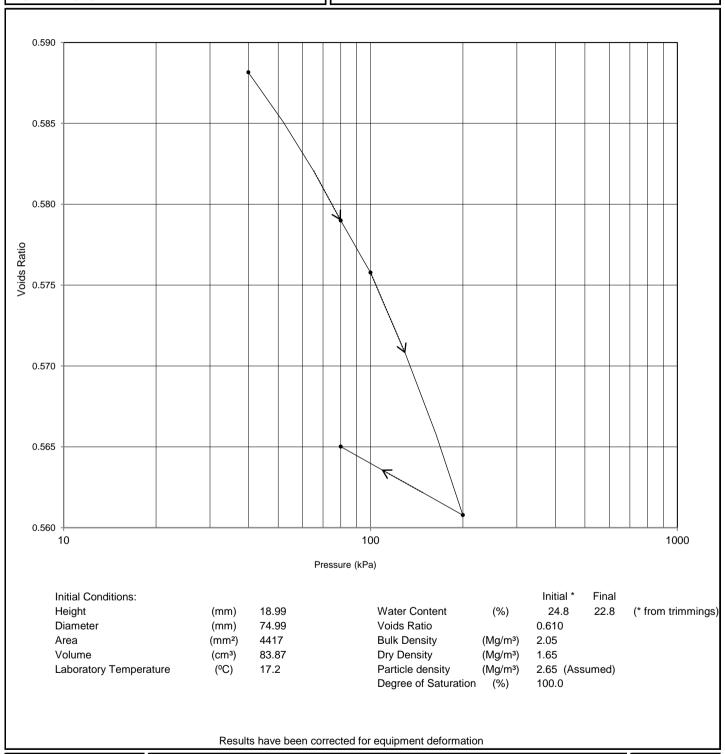
Location BH01-W Sample Ref. 18
Depth (m) 4.20-4.65

Sample Type UT
Depth within original (mm) 4.30-4.36

Orientation within original Vertical Specimen preparation Undisturbed

Description:

Firm to Stiff fissured brown silty CLAY.



Checked and Approved by

Project Number:

GEO / 36980

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-4



Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

Page 1 of 2

GEOLABS

BS EN ISO 17892-5: 2017

INCREMENTAL LOADING OEDOMETER TEST

Location BH01-W Sample Ref. 18

Depth (m) 4.20-4.65 Sample Type UT

Depth within original (mm) 4.30-4.36 Orientation within original Vertical Specimen preparation Undisturbed Description:

Firm to Stiff fissured brown silty CLAY.

Pressure Range	m _v	C	Time	Fitting	
(kPa)	(m²/MN)	c _v (m²/year)	Method	minutes	Voids Ratio
0 - 40	0.34	6.3	t50	1.47	0.588
40 - 80	0.14	9.6	t90	4.03	0.579
80 - 100	0.10	11	t90	3.49	0.576
100 - 200	0.095	11	t90	3.54	0.561
200 - 80	0.023	15 (Sv)	t90	2.57	0.565

Checked and Approved by

Project Number:

Project Name:

GEO / 36980

CROWLE FLOOD ALLEVIATION GI F2033-22-4



Test Report By GEOLABS Limited

Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX Client: SOCOTEC UK Ltd, Geotechnical House, Unit 18 & 19 Drome Road, Deeside Industrial Park, Flintshire, CH5 2NY Page 2 of 2

- 36980-465698.XLSM

1731 - UUTXL BH01-W 06.20 23 UT Test 01

UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

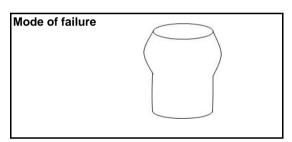
BH01-W Location Sample Ref 23 Depth (m) 6.20-6.65 Sample Type UT

Description:

Firm to stiff dark brow CLAY.

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	201.0
Diameter	(mm)	102.2
Moisture content	(%)	29.5
Bulk density	(Mg/m³)	2.11
Dry density	(Mg/m³)	1.63
Test Details		
Latex membrane thickness	(mm)	0.3
Specimen height prior to shearing	(mm)	201.0
Membrane correction	(kPa)	1.1
Mean rate of shear	(%/min)	2.0
Cell pressure	(kPa)	120
Strain at failure	(%)	19.9
Maximum deviator stress	(kPa)	196
Shear Stress Cu	(kPa)	98



Orientation of the sample	Vertical
Distance from top of tube mm	20

Tested by SB

Project Number:

GEO / 36980

Project Name:

CROWLE FLOOD ALLEVIATION GI



F2033-22-4

UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

BH01-W Location Sample Ref 31 Depth (m) 9.20-9.65 Sample Type UT

- 36980-465696.XLSM

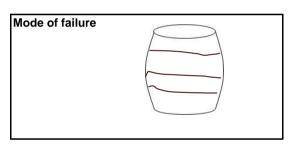
1731 - UUTXL BH01-W 09.20 31 UT Test 01

Description:

Very stiff brown mottled grey sandy silty CLAY.

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	200.3
Diameter	(mm)	103.3
Moisture content	(%)	14.9
Bulk density	(Mg/m³)	2.01
Dry density	(Mg/m³)	1.75
Test Details		
Latex membrane thickness	(mm)	0.3
Specimen height prior to shearing	(mm)	200.3
Membrane correction	(kPa)	1.1
Mean rate of shear	(%/min)	2.0
Cell pressure	(kPa)	180
Strain at failure	(%)	20.0
Maximum deviator stress	(kPa)	328
Shear Stress Cu	(kPa)	164



Orientation of the sample	Vertical
Distance from top of tube mm	145

Tested by SB Checked and Approved by

Project Number:

Project Name:

GEO / 36980

CROWLE FLOOD ALLEVIATION GI F2033-22-4



Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

Page 1 of 1

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK MATERIALS

		Sa	ample details			Der	nsity			pressio	on Test (L				ompression frame used)
Borehole Ref.	Sample Ref.	Depth (m)	Description	MC (%)	Degree of Saturation (%)	Bulk (Mg/m³)	Dry (Mg/m³)	Mean aft Diameter (mm)	er prep. Height (mm)	H/D Ratio	Load at Failure (kN)	UCS (MPa) 3 sig. fig.	Failure Sketch	D. Tested	Remarks
BH01-W	101	12.71- 12.92	Very Weak orangish brown SILTSTONE. Completely weathered	12	64.3	2.12	1.90	86.40	132.20	1.5	9.8	1.67		02/12/22	Low H:D ratio agreed by client
BH01-W	102	18.48- 18.76	Weak to Medium strong thinly laminated orangish brown fine grained SANDSTONE. Highly weathered	6.7	72.0	2.44	2.28	86.10	164.30	1.9	44.7	7.68		02/12/22 02/12/22	
BH01-W	103	19.00- 19.21	Weak to Medium strong thinly laminated orangish brown fine grained SANDSTONE. Highly weathered	6.1	64.9	2.42	2.28	85.70	159.40	1.9	43.7	7.58		02/12/22	

Note: The dimensional requirements of flatness (<0.02 mm), perpendicularity (<0.05 / 50 mm) and straightness (0.3 mm deviation) are all met. Specific Gravity used for Degree of Saturation is assumed unless specified by the client.

Checked and Approved by

Project Number:

GEO / 36981

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-5



UNIAXIAL COMPRESSIVE STRENGTH OF ROCK MATERIALS

Borehole Ref.: BH01-W Sample Ref.: 101 Depth (m): 12.71-12.92 Description:

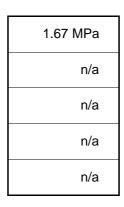
Very Weak orangish brown SILTSTONE. Completely weathered

86.40 mm 132.20 mm 2.12 Mg/m³ 1.90 Mg/m³ 12 %

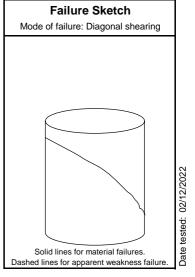
Degree of Saturation: 64.3 % Specific Gravity: 2.9 Mg/m³ (Assumed)

Test results

Unconfined Compressive Strength Maximum load (kN): 9.80
Young's Modulus
(tangential at 50% failure load)
Poisson's Ratio
(tangential at 50% failure load)
Young's Modulus
(secant at 10% failure load)
Poisson's Ratio
(secant at 10% failure load)



LF0879C (1000kN) compression frame used



Angle of foliation/Axis of loading: n/a
Angle of shear plane/Axis of loading: n/a

Sample type C

Remarks: Low H:D ratio agreed by client

05/12/2022

Note: The dimensional requirements of Flatness (<0.02 mm), Perpendicularity (<0.05 / 50 mm) and Straightness (0.3 mm deviation) are all met.

Checked and Approved by

Date:

Project Number:

GEO / 36981

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-5



Test Report By GEOLABS Limited Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX
Client: SOCOTEC UK Ltd, Geotechnical House, Unit 18 & 19 Drome Road, Deeside Industrial Park, Flintshire, CH5 2NY

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK MATERIALS

Borehole Ref.: BH01-W Sample Ref.: 102 Depth (m): 18.48-18.76 Description:

Weak to Medium strong thinly laminated orangish brown fine grained

SANDSTONE. Highly weathered

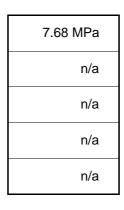
Diameter	
Height	
Bulk Density	
Dry Density	
Water Content	

86.10 mm
164.30 mm
2.44 Mg/m³
2.28 Mg/m ³
6.7 %

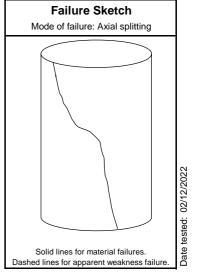
Degree of Saturation: 72.0 % Specific Gravity: 2.9 Mg/m³ (Assumed)

Test results

Unconfined Compressive Strength Maximum load (kN): 44.70
Young's Modulus
(tangential at 50% failure load)
Poisson's Ratio
(tangential at 50% failure load)
Young's Modulus
(secant at 10% failure load)
Poisson's Ratio
(secant at 10% failure load)



LF0879C (1000kN) compression frame used



Angle of foliation/Axis of loading: n/a
Angle of shear plane/Axis of loading: n/a

Sample type C

Note: The dimensional requirements of Flatness (<0.02 mm), Perpendicularity (<0.05 / 50 mm) and Straightness (0.3 mm deviation) are all met.

Checked and Approved by

Project Number:

GEO / 36981

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-5



Date: 05/12/2022

Test Report By GEOLABS Limited

UNIAXIAL COMPRESSIVE STRENGTH OF ROCK MATERIALS

Borehole Ref.: BH01-W Sample Ref.: 103 Depth (m): 19.00-19.21 Description:

Weak to Medium strong thinly laminated orangish brown fine grained

SANDSTONE. Highly weathered

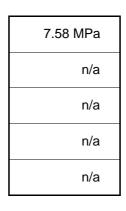
Diameter
Height
Bulk Density
Dry Density
Water Content

85.70 mm	
159.40 mm	
2.42 Mg/m ³	
2.28 Mg/m ³	
6.1 %	

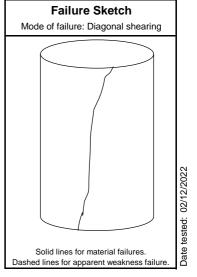
Degree of Saturation: 64.9 % Specific Gravity: 2.9 Mg/m³ (Assumed)

Test results

Unconfined Compressive Strength Maximum load (kN): 43.70
Young's Modulus
(tangential at 50% failure load)
Poisson's Ratio
(tangential at 50% failure load)
Young's Modulus
(secant at 10% failure load)
Poisson's Ratio
(secant at 10% failure load)



LF0879C (1000kN) compression frame used



Angle of foliation/Axis of loading: n/a
Angle of shear plane/Axis of loading: n/a

Sample type C

Note: The dimensional requirements of Flatness (<0.02 mm), Perpendicularity (<0.05 / 50 mm) and Straightness (0.3 mm deviation) are all met.

Checked and Approved by

05/12/2022

Date:

Project Number:

GEO / 36981

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-5



Test Report By GEOLABS Limited Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

Client: SOCOTEC UK Ltd, Geotechnical House, Unit 18 & 19 Drome Road, Deeside Industrial Park, Flintshire, CH5 2NY

DETERMINATION OF THE WATER CONTENT OF A ROCK SAMPLE

Sample details				Test r	esults	
Borehole Ref.	Sample Ref.	Depth (m)	Description	Water Content (%)	Oven Temp. (°C)	Remarks
BH01-W	104	10.02-10.11	Weak thinly laminated reddish brown MUDSTONE. Highly weathered	10.6	105°	
BH01-W	105	10.12-10.17	Weak thinly laminated reddish brown MUDSTONE. Highly weathered	16.2	105°	
BH01-W	106	10.78-10.84	Weak thinly laminated reddish brown MUDSTONE. Highly weathered	10.4	105°	
BH01-W	107	10.84-10.91	Weak thinly laminated reddish brown MUDSTONE. Highly weathered	7.9	105°	
BH01-W	108	10.91-10.95	Weak thinly laminated reddish brown MUDSTONE. Highly weathered	7.7	105°	
BH01-W	109	10.95-11.04	Strong brown METAMORPHIC ROCK. Moderately weathered	6.0	105°	
BH01-W	110	11.46-11.50	Strong thinly laminated orangish brown SILTSTONE. Moderately weathered	9.0	105°	
BH01-W	111	11.65-11.70	Strong thinly laminated orangish brown SILTSTONE. Moderately weathered	10.6	105°	
BH01-W	112	11.85-11.94	Strong thinly laminated orangish brown SILTSTONE. Moderately weathered	12.8	105°	
BH01-W	113	11.94-12.00	Strong thinly laminated orangish brown SILTSTONE. Moderately weathered	12.6	105°	

Note: Water Content in a rock sample as received

Checked and Approved by

Date:

Project Number:

GEO / 36981

05/12/2022

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-5



DETERMINATION OF THE WATER CONTENT OF A ROCK SAMPLE

			Sample details	Test r	esults	
Borehole Ref.	Sample Ref.	Depth (m)	Description	Water Content (%)	Oven Temp. (°C)	Remarks
BH01-W	115	12.33-12.38	Strong thinly laminated orangish brown SILTSTONE. Moderately weathered. Slightly calcareous	11.8	105°	
BH01-W	116	12.38-12.43	Strong thinly laminated orangish brown SILTSTONE. Moderately weathered. Slightly calcareous	13.1	105°	
BH01-W	117	12.43-12.56	Strong thinly laminated orangish brown SILTSTONE. Moderately weathered. Slightly calcareous	12.7	105°	
BH01-W	118	12.59-12.70	Strong thinly laminated orangish brown SILTSTONE. Moderately weathered. Slightly calcareous	9.3	105°	
BH01-W	119	12.92-13.12	Weak thinly laminated reddish brown MUDSTONE. Highly weathered	11.8	105°	
BH01-W	120	13.12-13.23	Strong thinly laminated orangish brown SILTSTONE. Moderately weathered. Slightly calcareous	15.4	105°	
BH01-W	121	13.23-13.36	Strong thinly laminated orangish brown SILTSTONE. Moderately weathered	13.3	105°	
BH01-W	122	13.49-13.55	Strong thinly laminated orangish brown SILTSTONE. Moderately weathered. Slightly calcareous	10.1	105°	
BH01-W	123	13.61-13.70	Strong thinly laminated brown SILTSTONE. Moderately weathered	4.7	105°	
BH01-W	124	13.87-13.92	Strong thinly laminated brown SILTSTONE. Moderately weathered	7.0	105°	

Note: Water Content in a rock sample as received

Checked and Approved by

Project Number:

Project Name:

GEO / 36981

05/12/2022

CROWLE FLOOD ALLEVIATION GI

F2033-22-5



Date:

Page 2 of 6

DETERMINATION OF THE WATER CONTENT OF A ROCK SAMPLE

			Sample details	Test r	esults	
Borehole Ref.	Sample Ref.	Depth (m)	Description	Water Content (%)	Oven Temp. (°C)	Remarks
BH01-W	125	13.97-14.02	Strong thinly laminated orangish brown SILTSTONE. Moderately weathered. Slightly calcareous	12.6	105°	
BH01-W	126	14.02-14.08	Strong thinly laminated orangish brown SILTSTONE. Moderately weathered	10.0	105°	
BH01-W	127	14.60-14.93	Strong thinly laminated orangish brown SILTSTONE. Moderately weathered	7.4	105°	
BH01-W	128	15.14-15.20	Strong light grey GYPSUM. Slightly weathered	10.8	105°	
BH01-W	129	15.29-15.38	Strong thinly laminated brownish grey SILTSTONE. Moderately weathered	8.7	105°	
BH01-W	130	15.40-15.46	Strong thinly laminated brownish grey fine grained SANDSTONE. Slightly weathered	8.6	105°	
BH01-W	131	15.54-15.63	Strong thinly laminated brownish grey fine grained SANDSTONE. Slightly weathered	6.2	105°	
BH01-W	132	15.68-15.78	Strong thinly laminated brownish grey fine grained SANDSTONE. Slightly weathered	8.4	105°	
BH01-W	133	16.04-16.12	Strong thinly laminated brownish grey fine grained SANDSTONE. Slightly weathered	6.8	105°	
BH01-W	134	16.28-16.42	Strong thinly laminated orangish brown SILTSTONE. Moderately weathered	7.1	105°	

Note: Water Content in a rock sample as received

Checked and Approved by

Project Number:

Project Name:

GEO / 36981

Date:

CROWLE FLOOD ALLEVIATION GI

F2033-22-5



05/12/2022

DETERMINATION OF THE WATER CONTENT OF A ROCK SAMPLE

			Sample details	Test	results	
Borehole Ref.	Sample Ref.	Depth (m)	Description	Water Content (%)	Oven Temp. (°C)	Remarks
BH01-W	135	16.55-16.65	Strong thinly laminated brownish grey fine grained SANDSTONE. Slightly weathered	7.6	105°	
BH01-W	136	16.65-16.70	Strong thinly laminated brownish grey fine grained SANDSTONE. Slightly weathered	7.1	105°	
BH01-W	137	16.70-16.76	Strong white to cream GYPSUM. Slightly weathered	12.0	105°	
BH01-W	138	17.00-17.06	Strong thinly laminated greenish grey fine grained SANDSTONE. Slightly weathered	7.2	105°	
BH01-W	139	17.25-17.35	Strong thinly laminated greenish grey fine grained SANDSTONE. Slightly weathered	6.7	105°	
BH01-W	140	17.35-17.42	Strong thinly laminated brownish grey fine grained SANDSTONE. Slightly weathered	8.1	105°	
BH01-W	141	17.46-17.54	Strong thinly laminated orangish brown SILTSTONE. Moderately weathered	9.5	105°	
BH01-W	142	18.03-18.19	Strong thinly laminated orangish brown SILTSTONE. Moderately weathered	7.9	105°	
BH01-W	143	18.22-18.34	Strong brownish grey fine grained SANDSTONE. Moderately weathered	7.1	105°	
BH01-W	144	18.87-18.94	Strong light grey GYPSUM. Slightly weathered	9.5	105°	

Note: Water Content in a rock sample as received

Checked and Approved by

Project Number:

GEO / 36981

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-5

GEOLABS

Date:

05/12/2022

DETERMINATION OF THE WATER CONTENT OF A ROCK SAMPLE

	Sample details					
Borehole Ref.	Sample Ref.	Depth (m)	Description	Water Content (%)	Oven Temp. (°C)	Remarks
BH01-W	145	19.42-19.58	Strong brownish grey fine grained SANDSTONE. Moderately weathered	3.5	105°	
BH01-W	146	19.67-19.77	Strong thinly laminated reddish brown fine grained SANDSTONE. Slightly weathered	10.0	105°	
BH01-W	147	19.77-19.84	Strong white to cream GYPSUM. Slightly weathered	14.2	105°	
BH01-W	148	19.93-20.17	Strong thinly laminated greenish grey fine grained SANDSTONE. Slightly weathered	6.7	105°	
BH01-W	149	20.17-20.28	Strong thinly laminated greenish grey fine grained SANDSTONE. Slightly weathered	5.4	105°	
BH01-W	150	20.40-20.55	Strong brownish grey fine grained SANDSTONE. Moderately weathered	6.5	105°	
BH01-W	151	20.70-20.86	Strong thinly laminated greenish grey fine grained SANDSTONE. Fresh to slightly weathered	7.0	105°	
BH01-W	152	20.86-20.94	Strong brownish grey fine grained SANDSTONE. Moderately weathered	9.8	105°	
BH01-W	153	21.00-21.07	Strong thinly laminated brownish grey fine grained SANDSTONE. Slightly weathered	5.7	105°	
BH01-W	154	21.36-21.50	Strong thinly laminated brownish grey fine grained SANDSTONE. Slightly weathered	8.6	105°	

Note: Water Content in a rock sample as received

Checked and Approved by

Project Number:

GEO / 36981

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-5

Date:

05/12/2022

GEOLABS

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DETERMINATION OF THE WATER CONTENT OF A ROCK SAMPLE

	Sample details					
Borehole Ref.	Sample Ref.	Depth (m)	Description W Co		Oven Temp. (°C)	Remarks
BH01-W	155	21.55-21.75	Strong thinly laminated brownish grey fine grained SANDSTONE. Slightly weathered	6.3	105°	
BH01-W	156	21.75-21.78	Strong greenish grey fine grained SANDSTONE. Fresh to slightly weathered	3.2	105°	
BH01-W	157	21.79-21.90	Strong thinly laminated greenish grey fine grained SANDSTONE. Fresh to slightly weathered	4.0	105°	
BH01-W	158	22.03-22.11	Strong thinly laminated brown fine grained SANDSTONE. Slightly weathered	8.3	105°	
BH01-W	159	22.34-22.42	Strong brown fine grained SANDSTONE. Moderately weathered	12.1	105°	
BH01-W	160	23.54-23.64	Strong thinly laminated brownish grey fine grained SANDSTONE. Slightly weathered	5.0	105°	
BH01-W	161	23.66-23.72	Strong thinly laminated brownish grey fine grained SANDSTONE. Slightly weathered	9.8	105°	
BH01-W	162	23.76-23.83	Strong thinly laminated greenish grey fine grained SANDSTONE. Fresh to slightly weathered	4.0	105°	
BH01-W	163	23.85-23.98	Strong greenish grey fine grained SANDSTONE. Fresh to slightly weathered	2.7	105°	
BH01-W	114	12.17-12.24	Weak thinly laminated orangish brown SILTSTONE. Moderately weathered	12.9	105°	

Note: Water Content in a rock sample as received

Checked and Approved by

Project Number:

GEO / 36981

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-5



SUMMARY OF GEOTECHNICAL TESTING

	Sample details				Classification Tests			Density Tests			Undrained Triaxial Compression			Ch	emical Te	ests			
Location	Depth (m)	Sample Ref	Туре	Description	wc	LL %	PL %		<425 μm %	Bulk Mg/m³	Dry Mg/m³	Condition	Cell Pressure kPa	Deviator Stress kPa	Shear Stress kPa	pН	2:1 W/S SO4 g/L	W/S Mg mg/L	Other tests and comments
WS04-E	0.30-0.90	4	В																Chemical
WS04-E	1.30-2.00	10	В	Orangish brown clayey fine to medium SAND.															Particle Size Distribution
WS09-C	0.30-1.00	6	В	Brown clayey silty SAND with rare gravel.															Particle Size Distribution Chemical
WS09-C	3.00-3.45	13	D	Grey and brown mottled CLAY with rare fine to medium gravel.	22.0	37	20	17	100										

Sample type: B (Bulk disturb.) BLK (Block) C (Core) D (Disturbed) LB (Large Bulk dist.) U (Undisturbed)

Checked and Approved by
•
20/01/2023

Project Number:

GEO / 37155

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-6 **GEOLABS**

1240 - Chemical Test Summary - 37155.XLSM SUMMARY OF CHEMICAL TESTS ON SOIL Water Soluble Sulphate as SO4 2:1 Water:Soil Extract Total Acid Soluble Sulphate as SO4 Water Soluble Chloride Mass Loss on Ignition Water Soluble Nitrate Carbonate Content **Organic Content** Total Sulphur Magnesium oH Value Sample Sample Depth Location Ref Type m % g/l % g/l g/l g/l % % % WS04-E 0.30-0.90 4 В 8.4 0.17 0.17 0.051 0.20 < 0.010 WS09-C 0.30-1.00 6 В 8.2 0.040 0.12 0.013 < 0.010 < 0.010

Tested by Chemtest Ltd : MCERTS / UKAS No 2183

Checked and Approved by:
20/01/2023

Project Number:

GEO / 37155

Project Name:

CROWLE FLOOD ALLEVIATION GI F2033-22-6 **GEOLABS**

PARTICLE SIZE DISTRIBUTION

Location WS04-E Sample Ref 10 Depth (m) 1.30-2.00 Sample Type

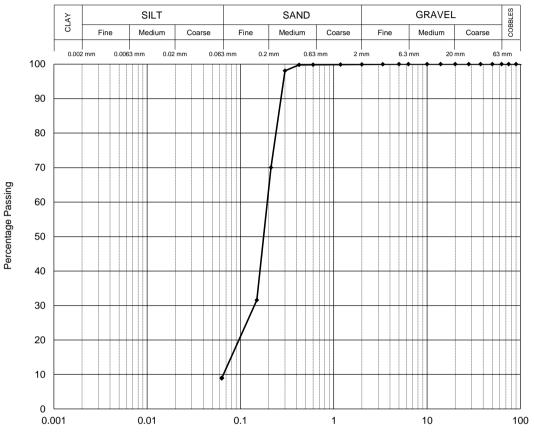
1262 - PSD WS04-E 01.30 10 B Test WS - 37155-468399.XLSM

Description

Orangish brown clayey fine to medium SAND.

BS EN ISO 17892-4: 2016: Clause 5.2 - Wet Sieve

Sieve						
Size	% Pass					
200.0 mm	100					
125.0 mm	100					
90.0 mm	100					
75.0 mm	100					
63.0 mm	100					
50.0 mm	100					
37.5 mm	100					
28.0 mm	100					
20.0 mm	100					
14.0 mm	100					
10.0 mm	100					
6.30 mm	100					
5.00 mm	100					
3.35 mm	100					
2.00 mm	100					
1.18 mm	100					
600 µm	100					
425 µm	100					
300 µm	98					
212 µm	70					
150 µm	32					
63 µm	9					



Particle Size (mm)

Particle Proportions						
Cobbles	0.0					
Gravel	0.1					
Sand	91.0					
Silt & Clay	8.9					

Tested by PK Checked and Approved by

GL Version 115.230118-1262

Project Number:

Project Name:

GEO / 37155

CROWLE FLOOD ALLEVIATION GI F2033-22-6



Test Report By GEOLABS Limited

Unit D3 HRS Business Park, Granby Avenue, Birmingham, B33 0SJ

(Ref 1674214283)

PARTICLE SIZE DISTRIBUTION

Location WS09-C Sample Ref 0.30-1.00 Depth (m) Sample Type

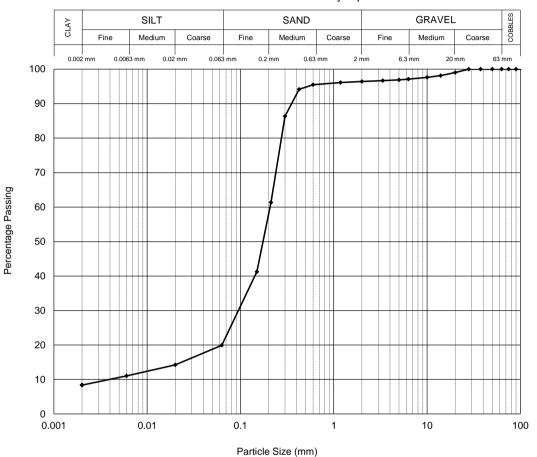
1262 - PSD WS09-C 00.30 6 B Test WS PP - 37155-468400.XLSM

Description

Brown clayey silty SAND with rare gravel.

BS EN ISO 17892-4: 2016: Clause 5.2 - Wet Sieve BS EN ISO 17892-4: 2016: Clause 5.4 - Sedimentation by Pipette

Sieve					
Size	% Pass				
200.0 mm	100				
125.0 mm	100				
90.0 mm	100				
75.0 mm	100				
63.0 mm	100				
50.0 mm	100				
37.5 mm	100				
28.0 mm	100				
20.0 mm	99				
14.0 mm	98				
10.0 mm	98				
6.30 mm	97				
5.00 mm	97				
3.35 mm	97				
2.00 mm	96				
1.18 mm	96				
600 µm	96				
425 µm	94				
300 µm	86				
212 µm	61				
150 µm	41				
63 µm	20				



Cadinaaa	4-4:				
Sedimentation					
No Pre-treatr	ment used				
Temp (°C)	25.0				
Size	% Pass				
20 µm	14				
6 µm	11				
2 µm	8				
Particle Density 2	2.70(A) Mg/m ³				

Particle Proportions				
Cobbles	0.0			
Gravel	3.6			
Sand	76.5			
Silt	11.6			
Clay	8.3			

Tested by PK Checked and Approved by

GL Version 115.230118-1262

Project Number:

Project Name:

GEO / 37155

CROWLE FLOOD ALLEVIATION GI F2033-22-6







Environmental Chemistry

Certificate of Analysis

Client: SOCOTEC Geotechnical

Project: 22100924

Quote: BEC220926768 V3.1

Project Ref: F2033-22

Site: F2033-22 Crowle Flood Alleviation

Contact:

Address: Geotechnical House

18-19 Drome Road

Deeside Flintshire CH5 2NY

E-Mail:

Phone: 07917 263636

No. Samples Received: 9

Date Received: 13/10/2022

Analysis Date: 20/10/2022

Date Issued: 21/10/2022

Report Type: Final Version 01

This report supersedes any versions previously issued by the laboratory



SOCOTEC Environmental Chemistry, Bretby Business Park, Ashby Road, Burton-Upon-Trent, DE15 0YZ



Project Name: F2033-22-F2033-22 Crowle Flood Alleviation

Project No: 22100924 Date Issued: 21/10/2022

Samples Analysed

Text ID	Sample Reference	Sampling Date	Sample Type	Sample Description
22100924-001	BH02-E-7-D-2.00	30/09/2022 00:00:00	SOLID	Soil Sample
22100924-002	BH02-E-9-D-3.00	30/09/2022 00:00:00	SOLID	Soil Sample
22100924-003	WS02-W-7-D-1.80	04/10/2022 10:35:00	SOLID	Soil Sample
22100924-004	WS02-W-9-D-2.05	04/10/2022 11:07:00	SOLID	Soil Sample
22100924-005	WS02-W-11-D-2.70	04/10/2022 11:08:00	SOLID	Soil Sample
22100924-006	WS02-W-12-D-2.90	04/10/2022 11:11:00	SOLID	Soil Sample
22100924-007	WS03-E-9-D-2.00	26/09/2022 13:16:00	SOLID	Soil Sample
22100924-008	WS07-A-7-D-1.70	27/09/2022 12:09:00	SOLID	Soil Sample
22100924-009	WS07-A-11-D-2.50	27/09/2022 12:26:00	SOLID	Soil Sample



Project Name: F2033-22-F2033-22 Crowle Flood Alleviation

Project No: 22100924 Date Issued: 21/10/2022



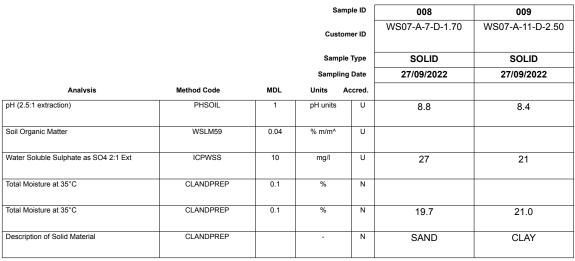
Analysis Results

										1	
			Sa	imple ID	001	002	003	004	005	006	007
			Cust	omer ID	BH02-E-7-D-2.00	BH02-E-9-D-3.00	WS02-W-7-D-1.80	WS02-W-9-D-2.05	WS02-W-11-D-2.70	WS02-W-12-D-2.90	WS03-E-9-D-2.00
			Sam	ple Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID
			Sampl	ing Date	30/09/2022	30/09/2022	04/10/2022	04/10/2022	04/10/2022	04/10/2022	26/09/2022
Analysis	Method Code	MDL	Units	Accred.							
pH (2.5:1 extraction)	PHSOIL	1	pH units	U	8.6	11.0	7.9			7.7	8.9
Soil Organic Matter	WSLM59	0.04	% m/m^	U				1.24	0.95		
Water Soluble Sulphate as SO4 2:1 Ext	ICPWSS	10	mg/l	U	86	265	46			51	23
Total Moisture at 35°C	CLANDPREP	0.1	%	N				18.1	21.6		
Total Moisture at 35°C	CLANDPREP	0.1	%	N	15.1	22.2	21.1			17.5	12.8
Description of Solid Material	CLANDPREP		-	N	SAND	SAND	SAND	CLAY	SAND	SAND	SAND

Project Name:

Project No: 22100924 Date Issued: 21/10/2022

Analysis Results







Project Name: F2033-22-F2033-22 Crowle Flood Alleviation

Project No: 22100924 Date Issued: 21/10/2022

Deviating Sample Report

Sample Reference	<u>Text ID</u>	Method Code	Incorrect Container	Incorrect Label	Headspace	Incorrect/No Preservative	No Sampling Date	Holding Time
BH02-E-7-D-2.00	22100924-001	PHSOIL						✓
BH02-E-9-D-3.00	22100924-002	PHSOIL						✓
WS03-E-9-D-2.00	22100924-007	PHSOIL						✓
WS07-A-7-D-1.70	22100924-008	PHSOIL						✓
WS07-A-11-D-2.50	22100924-009	PHSOIL						✓

Analysis Method

Method Code	Method Description	Analysis Method
CLANDPREP	Basic Solid Description	As Received
CLANDPREP	CLand Prep Dry Weight Content @ 35°C	As Received
CLANDPREP	DW35 - CLand Prep and Dry Weight Correction to 35°C	As Received
ICPWSS	Sulphate as SO4 (Water Soluble 2:1 Extract)	Air Dried & Ground
PHSOIL	pH (2.5:1)	As Received
WSLM59	SOM: Soil Organic Matter (%) (Calc)	Air Dried & Ground

Result Report Notes

Letters alongside results signify that the result has associated report notes.

The report notes are as follows:

Letter Note

- A Due to the matrix of the sample the laboratory has had to deviate from our standard protocols to be able to process the sample and provide a result. Where applicable the accreditation has been removed and this should be taken into consideration when utilising the data.
- B The QC associated with this result has not wholly met the QMS requirements, the accreditation has therefore been removed. However, the Laboratory has confidence in the performance of the method as a whole and that the integrity of the data has not been significantly compromised.
- Due to matrix interference, the internal standard and/or surrogate has not met the QMS requirements. This should be taken into consideration when utilising the data.
- D A non-standard volume or mass has been used for this test which has resulted in a raised detection limit.
- E Due to the parameter value being beyond our calibration range (and following the maximum size of dilution allowed, where applicable), the result cannot be quantified and as such the result will appear as a greater than symbol (>) with the accreditation removed. This data should be used for indicative purposes only.



Project Name: F2033-22-F2033-22 Crowle Flood Alleviation

Project No: 22100924 Date Issued: 21/10/2022

F Based on the sample history, appearance and smell a dilution was applied prior to testing. Unfortunately, the result is either above (>) or below (<) our calibration range. Results above our calibration range have accreditation removed. The data should

be used for indicative purposes only.

G The day 5 oxygen reading was below the capability of the instrument to detect, and therefore the calculated BOD has been

reported unaccredited for guidance purposes only.

HWOL Acronym Key

<u>Acronym</u> <u>Description</u>

HS Headspace Analysis

EH Extractable Hydrocarbons - i.e everything extracted by the solvent(s)

CU Clean up - e.g. by florisil, silica gel
1D GC - Single coil gas chromatography

Total Aliphatics & Aromatics

AL Aliphatics only AR Aromatics only

+ Operator to indicate cumulative e.g. EH_CU+HS_1D_Total



Project Name: F2033-22-F2033-22 Crowle Flood Alleviation

Project No: 22100924 Date Issued: 21/10/2022

Additional Information

This report refers to samples as received. SOCOTEC UK Ltd takes no responsibility for accuracy or competence of sampling by others.

Results within this report relate only to the samples tested.

The accreditation codes are as follows:

U = UKAS accredited analysis M = MCERT accredited analysis N = Unaccredited analysis

Any units marked with ^ signify results are reported on a dry weight basis of 35 ° C.

All Air Dried and Ground Samples (ADG) are oven dried at less than 35° c.

This report shall not be reproduced except in full, without written approval of the laboratory.

Opinions and interpretations given are outside the scope of our UKAS accreditation.

Any samples marked with * are not covered by our scope of UKAS accreditation. If applicable, further report notes have been added.

Any solid samples where the Major Constituents are not one of the following (Sand, Silt, Clay, Made Ground) are not one of our accredited matrix types.

Any samples marked with ‡ have had MCERTS accreditation removed for this result

Any samples marked with a tick in the deviant table is deviant for the specific reason.

Any samples reported as IS, NA, ND mean the following:

IS = Insufficient Sample to complete analysis

NA = Sample is not amenable for the required analysis

ND = Results cannot be determined

Items listed with a 'SUB' method code prefix have been carried out by an external subcontracted laboratory.

Our deviating sample report does not include deviancy information for Subcontracted analysis. Please see the report from the subcontracted lab for information regarding any deviancies for this analysis.

Summaries of analysis methods are available upon request.

End of Certificate of Analysis



Environmental Chemistry

Certificate of Analysis

Client: SOCOTEC Geotechnical

Project: 22101573

Quote: BEC220926768 V3.1

Project Ref: F2033-22

Site: F2033-22 Crowle Flood Alleviation

Contact:

Address: Geotechnical House

18-19 Drome Road

Deeside Flintshire CH5 2NY

E-Mail: @socotec.com

Phone:

No. Samples Received: 2

Date Received: 20/10/2022

Analysis Date: 27/10/2022

Date Issued: 27/10/2022

Report Type: Final Version 01

This report supersedes any versions previously issued by the laboratory



SOCOTEC Environmental Chemistry, Bretby Business Park, Ashby Road, Burton-Upon-Trent, DE15 0YZ



Project Name: F2033-22-F2033-22 Crowle Flood Alleviation

Project No: 22101573

Date Issued: 27/10/2022

Samples Analysed

Text ID	Sample Reference	Sampling Date	Sample Type	Sample Description
22101573-001	WS05-A-7-D-2.40	12/10/2022 09:45:00	SOLID	Soil Sample
22101573-002	WS06-A-10-D-3.00	11/10/2022 12:03:00	SOLID	Soil Sample



Project Name: F2033-22-F2033-22 Crowle Flood Alleviation

Project No: 22101573

Date Issued: 27/10/2022

Analysis Results

	001	002				
			Cus	stomer ID	WS05-A-7-D-2.40	WS06-A-10-D-3.00
			Sam	ple Type	SOLID	SOLID
			Samp	ling Date	12/10/2022	11/10/2022
Analysis	Method Code	MDL	Units	Accred.		
pH (2.5:1 extraction)	PHSOIL	1	pH units	U	7.0	5.6
Soil Organic Matter	WSLM59	0.04	% m/m^	U	1.07	34.0
Water Soluble Sulphate as SO4 2:1 Ext	ICPWSS	10	mg/l	U	277	766
Total Moisture at 35°C	CLANDPREP	0.1	%	N	19.6	54.3
Total Moisture at 35°C	CLANDPREP	0.1	%	N	19.6	54.3
Description of Solid Material	CLANDPREP		-	N	CLAY	SILT





Project Name: F2033-22-F2033-22 Crowle Flood Alleviation

Project No: 22101573 Date Issued: 27/10/2022

Deviating Sample Report

All samples received in an appropriate condition with no deviancies noted with the samples.

Analysis Method

Method Code Method Description Analysis Method **CLANDPREP Basic Solid Description** As Received **CLANDPREP** CLand Prep Dry Weight Content @ 35°C As Received DW35 - CLand Prep and Dry Weight Correction to 35°C **CLANDPREP** As Received **ICPWSS** Sulphate as SO4 (Water Soluble 2:1 Extract) Air Dried & Ground **PHSOIL** pH (2.5:1) As Received WSLM59 SOM: Soil Organic Matter (%) (Calc) Air Dried & Ground

Result Report Notes

Letters alongside results signify that the result has associated report notes. The report notes are as follows:

<u>Letter</u> <u>Note</u>

- A Due to the matrix of the sample the laboratory has had to deviate from our standard protocols to be able to process the sample and provide a result. Where applicable the accreditation has been removed and this should be taken into consideration when utilising the data.
- B The QC associated with this result has not wholly met the QMS requirements, the accreditation has therefore been removed. However, the Laboratory has confidence in the performance of the method as a whole and that the integrity of the data has not been significantly compromised.
- Due to matrix interference, the internal standard and/or surrogate has not met the QMS requirements. This should be taken into consideration when utilising the data.
- D A non-standard volume or mass has been used for this test which has resulted in a raised detection limit.
- E Due to the parameter value being beyond our calibration range (and following the maximum size of dilution allowed, where applicable), the result cannot be quantified and as such the result will appear as a greater than symbol (>) with the accreditation removed. This data should be used for indicative purposes only.
- F Based on the sample history, appearance and smell a dilution was applied prior to testing. Unfortunately, the result is either above (>) or below (<) our calibration range. Results above our calibration range have accreditation removed. The data should be used for indicative purposes only.
- G The day 5 oxygen reading was below the capability of the instrument to detect, and therefore the calculated BOD has been reported unaccredited for guidance purposes only.

HWOL Acronym Key

<u>Acronym</u> <u>Description</u>

HS Headspace Analysis

EH Extractable Hydrocarbons - i.e everything extracted by the solvent(s)

CU Clean up - e.g. by florisil, silica gel
1D GC - Single coil gas chromatography

Total Aliphatics & Aromatics
AL Aliphatics only

AR Aromatics only

Operator to indicate cumulative e.g. EH_CU+HS_1D_Total



Project Name: F2033-22-F2033-22 Crowle Flood Alleviation

Project No: 22101573 Date Issued: 27/10/2022

Additional Information

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Results within this report relate only to the samples tested.

The accreditation codes are as follows:

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Any units marked with ^ signify results are reported on a dry weight basis of 35 ° C.

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Our deviating sample report does not include deviancy information for Subcontracted analysis. Please see the report from the subcontracted lab for information regarding any deviancies for this analysis.

Summaries of analysis methods are available upon request.

End of Certificate of Analysis



Environmental Chemistry

Certificate of Analysis

Client: SOCOTEC Geotechnical

Project: 22121504

Quote: BEC220926768 V4.1

Project Ref: F2033-22

Site: F2033 Crowle

Contact:

Address: Geotechnical House

18-19 Drome Road

Deeside Flintshire CH5 2NY

E-Mail: @socotec.com

Phone:

No. Samples Received: 4

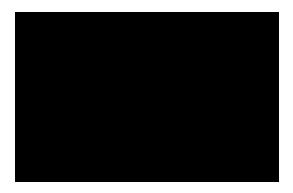
Date Received: 15/12/2022

Analysis Date: 23/12/2022

Date Issued: 23/12/2022

Report Type: Final Version 01

This report supersedes any versions previously issued by the laboratory



SOCOTEC Environmental Chemistry, Bretby Business Park, Ashby Road, Burton-Upon-Trent, DE15 0YZ



Project No: 22121504 Date Issued: 23/12/2022

Samples Analysed

Text ID	Sample Reference	Sampling Date	Sample Type	Sample Description
22121504-001	WS04-E-14-B-4.30-5.00	13/12/2022 00:00:00	SOLID	Soil Sample
22121504-002	WS09-C-14-D-3.85-3.85	13/12/2022 00:00:00	SOLID	Soil Sample
22121504-003	WS04-E-4-B-0.30-0.90	13/12/2022 00:00:00	SOLID	Soil Sample
22121504-004	WS09-C-6-B-0.30-1.00	13/12/2022 00:00:00	SOLID	Soil Sample



Project No: 22121504 Date Issued: 23/12/2022

Analysis Results

			S	Sample ID	001	002	003	004
			Cus	stomer ID	WS04-E-14-B-4.30- 5.00	WS09-C-14-D-3.85- 3.85	WS04-E-4-B-0.30-0. 90	WS09-C-6-B-0.30-1.
			San	nple Type	SOLID	SOLID	SOLID	SOLID
			Samp	oling Date	13/12/2022	13/12/2022	13/12/2022	13/12/2022
Analysis	Method Code	MDL	Units	Accred.				
pH (2.5:1 extraction)	PHSOIL	1	pH units	U	8.5	8.8	8.7	8.2
Chloride as Cl	KONECL	2	mg/kg	N			27	423
Nitrate as NO3	KONENO3	2	mg/kg	N			<4.0 p	<4.0 p
Magnesium as Mg (2:1 Extract)	ICPWSMG	0.1	mg/l	N			7.4	16.0
Water Soluble Sulphate as SO4 2:1 Ext	ICPWSS	10	mg/l	U	54	44	33	44
Total Moisture at 35°C	CLANDPREP	0.1	%	N	16.1	15.3	13.6	14.5
Description of Solid Material	CLANDPREP		-	N	SAND	CLAY	SAND	SILT





Project No: 22121504 Date Issued: 23/12/2022

Deviating Sample Report

All samples received in an appropriate condition with no deviancies noted with the samples.

Analysis Method

Method Code Method Description Analysis Method **CLANDPREP Basic Solid Description** As Received **CLANDPREP** CLand Prep Dry Weight Content @ 35°C As Received **ICPWSMG** Magnesium (Water Soluble) (2:1) Air Dried & Ground **ICPWSS** Sulphate as SO4 (Water Soluble 2:1 Extract) Air Dried & Ground **KONECL** Chloride (2:1) by Colorimetry Air Dried & Ground KONENO3 Nitrate as NO3 (2:1) by Colorimetry Air Dried & Ground **PHSOIL** pH (2.5:1) As Received

Result Report Notes

Letters alongside results signify that the result has associated report notes. The report notes are as follows:

Let	ter	N	o	te

- A Due to the matrix of the sample the laboratory has had to deviate from our standard protocols to be able to process the sample and provide a result. Where applicable the accreditation has been removed and this should be taken into consideration when utilising the data.
- B The QC associated with this result has not wholly met the QMS requirements, the accreditation has therefore been removed. However, the Laboratory has confidence in the performance of the method as a whole and that the integrity of the data has not been significantly compromised.
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- F Based on the sample history, appearance and smell a dilution was applied prior to testing. Unfortunately, the result is either above (>) or below (<) our calibration range. Results above our calibration range have accreditation removed. The data should be used for indicative purposes only.
- G The day 5 oxygen reading was below the capability of the instrument to detect, and therefore the calculated BOD has been reported unaccredited for guidance purposes only.



Project No: 22121504 Date Issued: 23/12/2022

HWOL Acronym Key

<u>Acronym</u> <u>Description</u>

HS Headspace Analysis

EH Extractable Hydrocarbons - i.e everything extracted by the solvent(s)

CU Clean up - e.g. by florisil, silica gel
1D GC - Single coil gas chromatography

Total Aliphatics & Aromatics

AL Aliphatics only AR Aromatics only

Operator to indicate cumulative e.g. EH CU+HS 1D Total

Additional Information

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Results within this report relate only to the samples tested.

The accreditation codes are as follows:

U = UKAS accredited analysis M = MCERT accredited analysis N = Unaccredited analysis

Any units marked with ^ signify results are reported on a dry weight basis of 105 ° C.

All Air Dried and Ground Samples (ADG) are oven dried at less than 35° c.

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Our deviating sample report does not include deviancy information for Subcontracted analysis. Please see the report from the subcontracted lab for information regarding any deviancies for this analysis.

Summaries of analysis methods are available upon request.

End of Certificate of Analysis



APPENDIX E GEOENVIRONMENTAL LABORATORY TEST RESULTS

Certificate of Analysis – (Soil/Leachate)	22100077
	22100078
	22100145
	22100355
	22100923
	22101067
	22102054
	22120845
	22121193
Certificate of Analysis – (Water)	22121065



Environmental Chemistry

Certificate of Analysis

Client: SOCOTEC Geotechnical

Project: 22100077

Quote: BEC221027085 V1.1

Project Ref: F2033-22

Site: F2033-22 Crowle

Contact:

Address: Geotechnical House

18-19 Drome Road

Deeside Flintshire CH5 2NY

E-Mail: @socotec.com

Phone:

No. Samples Received: 2

Date Received: 03/10/2022

Analysis Date: 14/10/2022

Date Issued: 14/10/2022

Report Type: Final Version 01

This report supersedes any versions previously issued by the laboratory



SOCOTEC Environmental Chemistry, Bretby Business Park, Ashby Road, Burton-Upon-Trent, DE15 0YZ



Project No: 22100077 Date Issued: 14/10/2022

Samples Analysed

Text ID	Sample Reference	Sampling Date	Sample Type	Sample Description
22100077-001	WS03-E-1-ES-0.20	26/09/2022 12:20:00	SOLID	Soil Sample
22100077-002	WS03-E-3-ES-0.70	26/09/2022 12:20:00	SOLID	Soil Sample



Project No: 22100077 Date Issued: 14/10/2022

Analysis Results

		Sample ID				002
	Customer ID					WS03-E-3-ES-0.70
			Sam	ple Type	SOLID	SOLID
			Sampling Date		26/09/2022	26/09/2022
Analysis	Method Code	MDL	Units	Accred.		
pH (2.5:1 extraction)	PHSOIL	1	pH units	UM	8.1	8.2
Conductivity in 5:1 Water Extract	TSCONW	10	μS/cm	N	203	168
Chloride as Cl	KONECL	2	mg/kg^	N	42	20
Chromium (VI) as Cr	KONENS	0.1	mg/kg^	N	<0.1	<0.1
Complex Cyanide	SFAPI	0.5	mg/kg^	UM	<0.6	<0.5
Free Cyanide	SFAPI	0.5	mg/kg^	UM	<0.6	<0.5
Sulphide as S	SFAPI	0.5	mg/kg^	N	1.8	<0.5
Total Cyanide	SFAPI	0.5	mg/kg^	UM	<0.6	<0.5
Soil Organic Matter	WSLM59	0.04	% m/m^	U	7.77	2.22
Arsenic as As	ICPMSS	0.3	mg/kg^	UM	10.1	7.9
Cadmium as Cd	ICPMSS	0.2	mg/kg^	UM	0.6	<0.2
Copper as Cu	ICPMSS	1.6	mg/kg^	UM	23.0	25.8
Lead as Pb	ICPMSS	0.7	mg/kg^	UM	33.9	24.0
Mercury as Hg	ICPMSS	0.5	mg/kg^	UM	<0.5	<0.5
Nickel as Ni	ICPMSS	2	mg/kg^	UM	18.8	18.0
Selenium as Se	ICPMSS	0.5	mg/kg^	UM	0.9	<0.5
Total Chromium as Cr	ICPMSS	1.2	mg/kg^	UM	16.9	18.7
Vanadium as V	ICPMSS	0.6	mg/kg^	N	32.3	26.2
Zinc as Zn	ICPMSS	16	mg/kg^	UM	124.7	55.8







Project No: 22100077

Date Issued: 14/10/2022

			S	ample ID	001	002
			Cus	tomer ID	WS03-E-1-ES-0.20	WS03-E-3-ES-0.70
			Sam	ple Type	SOLID	SOLID
			Samp	ling Date	26/09/2022	26/09/2022
Analysis	Method Code	MDL	Units	Accred.		
Boron as B	ICPBOR	0.5	mg/kg^	UM	2.3	2.1
Water Soluble Sulphate as SO4 by Mass	ICPWSS	20	mg/kg^	UM	299	121
Acid Soluble Sulphate as SO4	ICPACIDS	20	mg/kg^	UM	2090	755
Acenaphthene	PAHMSUS	0.08	mg/kg^	UM	0.43	<0.09
Acenaphthylene	PAHMSUS	0.08	mg/kg^	U	0.36	<0.09
Anthracene	PAHMSUS	0.08	mg/kg^	U	1.64	0.15
Benzo[a]anthracene	PAHMSUS	0.08	mg/kg^	UM	8.25	0.62
Benzo[a]pyrene	PAHMSUS	0.08	mg/kg^	UM	8.12	0.71
Benzo[b]fluoranthene	PAHMSUS	0.08	mg/kg^	UM	9.19	0.78
Benzo[g,h,i]perylene	PAHMSUS	0.08	mg/kg^	UM	4.28	0.49
Benzo[k]fluoranthene	PAHMSUS	0.08	mg/kg^	UM	3.67	0.35
Chrysene	PAHMSUS	0.08	mg/kg^	UM	7.59	0.62
Coronene	PAHMSUS	0.08	mg/kg^	N	1.17	0.19
Dibenzo[a,h]anthracene	PAHMSUS	0.08	mg/kg^	UM	1.14	0.18
Fluoranthene	PAHMSUS	0.08	mg/kg^	UM	15.9	1.24
Fluorene	PAHMSUS	0.08	mg/kg^	UM	0.38	<0.09
Indeno[1,2,3-cd]pyrene	PAHMSUS	0.08	mg/kg^	UM	4.71	0.50
Naphthalene	PAHMSUS	0.08	mg/kg^	UM	<0.09	<0.09
Phenanthrene	PAHMSUS	0.08	mg/kg^	UM	5.69	0.42







Project No: 22100077

Date Issued: 14/10/2022

			Sa	mple ID	001	002
			Cust	omer ID	WS03-E-1-ES-0.20	WS03-E-3-ES-0.70
			Samp	ole Type	SOLID	SOLID
			Sampli	ng Date	26/09/2022	26/09/2022
Analysis	Method Code	MDL	Units	Accred.		
Pyrene	PAHMSUS	0.08	mg/kg^	UM	13.3	1.08
Total PAH 16	PAHMSUS	1.28	mg/kg^	U	84.8	7.48
Total Moisture at 35°C	CLANDPREP	0.1	%	N	12.6	8.1
Description of Solid Material	CLANDPREP		-	N	SILT	SILT
Redox Potential	SUB016		mV	N	286.03	280.51
Asbestos Identification	SUB020		-	N	NAIIS	NAIIS







CERTIFICATE OF ANALYSIS

ANALYSIS REQUESTED BY: SOCOTEC UK Ltd CONTRACT NO: \$28298-5

Environmental Chemistry

DATE OF ISSUE: 12.10.22

PO Box 100 **Burton upon Trent** Staffordshire **DE15 0XD**

DATE SAMPLES RECEIVED: 05.10.22

DATE ANALYSIS COMPLETED: 11.10.22

DESCRIPTION: Two soi/loose aggregate samples each weighing approximately 1.3-1.5kg.

ANALYSIS REQUESTED: Qualitative and quantitative analysis of soil/loose aggregate samples for

mass determination of asbestos.

METHODS:

Qualitative - The samples were analysed qualitatively for asbestos by polarised light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative - The analysis was carried out using our documented in-house method based on HSE Contract Research Report No. 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire sample, detailed analysis of a representative sub-sample and quantification by hand picking/weighing and/or fibre counting/sizing as appropriate.

RESULTS:

Initial Screening

o asbestos was detected in either of the soil samples by stereo-binocular and polarised light microscopy.

A summary of the results is given in Table 1.

Page 1 of 2





Registered Address: Research Avenue North, Riccarton, Edinburgh, EH14 4AP, United Kingdom Tel: 0131 449 8000 Fax: 0131 449 8084 Email: iom@iom-world.org

IOM CONSULTING LIMITED, registered in Scotland No. SC205670



0374



CONTRACT NO: \$28298-5 **DATE OF ISSUE:** 12,10,22

RESULTS: (cont.)

Table 1: Qualitative Results

SOCOTEC Job I.D: 22100077

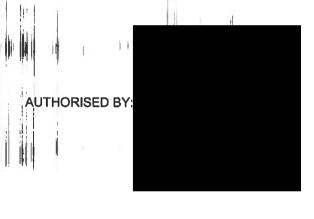
number	SOCOTEC Sample ID	Client Sample ID	ACM type detected	PLM result
"S28298-11	22100077-001	W\$03-E-1-ES-0.20	-	No Asbestos Detected
S28298-12	22100077-002	WS03-E-3-ES-0.70	-	No Asbestos Detected

Our detection limit for this method is 0.001%.

COMMENTS:

IOM Consulting cannot accept responsibility for samples that have been incorrectly collected or despatched by external clients.

Any opinions and interpretations expressed herein are out with the scope of our UKAS accreditation.





Element Materials Technology

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Socotec ESG ESG House, Bretby Business Park Bretby Burton upon Trent

Attention: Chem Subcon

Date: 7th October, 2022

Your reference : 22100077

Our reference : Test Report 22/16220 Batch 1

Location : F2033-22-Crowle

Date samples received : 5th October, 2022

Status: Final Report

Issue: 1

Two samples were received for analysis on 5th October, 2022 of which two were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.



Please include all sections of this report if it is reproduced

Element Materials Technology

Socotec Client Name:

22100077 Reference: F2033-22-Crowle Location:

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Contact:	
EMT Job No:	22/16220

EMI JOD NO:	22/10220								
EMT Sample No.	1	2							
Sample ID	WS03-E-1-ES- 0.20	WS03-E-3-ES- 0.70							
Depth	0.20	0.70					Diagram	#	-4 6!!
COC No / misc							abbrevi	e attached no ations and ac	cronyms
Containers		V							
Sample Date	26/09/2022	26/09/2022							
Sample Type	Soil	Soil							
Batch Number	1	1					LOD/LOR	Units	Method
Date of Receipt	05/10/2022	05/10/2022					LOD/LOR	Offics	No.
Redox Potential	286.03	280.51						mV	TM139/PM0

Client Name: Socotec Reference: 22100077

Location: F2033-22-Crowle

Contact:

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason				
	No deviating sample report results for job 22/16220									

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 22/16220

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCI (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

EMT Job No.: 22/16220

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
В	Indicates analyte found in associated method blank.
DR	Dilution required.
М	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
со	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
ТВ	Trip Blank Sample
ОС	Outside Calibration Range

Element Materials Technology

Method Code Appendix

EMT Job No: 22/16220

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM139	ASTM G200-09 (2014) Oxidation-Reduction potential of soil samples removed from the ground, using Redox probe and meter.	PM0	No preparation is required.			AR	No



Project No: 22100077 Date Issued: 14/10/2022

Deviating Sample Report

All samples received in an appropriate condition with no deviancies noted with the samples.

Analysis Method

Method Code	Method Description	Analysis Method
CLANDPREP	Basic Solid Description	As Received
CLANDPREP	DW35 - CLand Prep and Dry Weight Correction to 35°C	As Received
ICPACIDS	Sulphate as SO4 (Acid Soluble)	Air Dried & Ground
ICPBOR	Boron (Water Soluble) by ICPOES	Air Dried & Ground
ICPMSS	Arsenic in Solids by ICPMS	Air Dried & Ground
ICPMSS	Cadmium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Chromium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Copper in Solids by ICPMS	Air Dried & Ground
ICPMSS	Lead in Solids by ICPMS	Air Dried & Ground
ICPMSS	Mercury in Solids by ICPMS	Air Dried & Ground
ICPMSS	Nickel in Solids by ICPMS	Air Dried & Ground
ICPMSS	Selenium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Vanadium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Zinc in Solids by ICPMS	Air Dried & Ground
ICPWSS	Sulphate as SO4 (Water Soluble)	Air Dried & Ground
KONECL	Chloride (2:1) by Colorimetry	Air Dried & Ground
KONENS	Chromium VI (Hexavalent) by Colorimetry	Air Dried & Ground
PAHMSUS	17 PAHs (inc. Coronene) by GCMS	As Received
PHSOIL	pH (2.5:1)	As Received
SFAPI	Cyanide (Complex) by SFA	As Received
SFAPI	Cyanide (Free) by SFA	As Received
SFAPI	Cyanide (Total) by SFA	As Received
SFAPI	Sulphide by SFA	As Received
SUB016	Redox Potential in Soil	
SUB020	Asbestos Stage 1 (with Stage 2+3 Trigger)	
TSCONW	Electrical Conductivity (5:1)	Air Dried & Ground
WSLM59	SOM: Soil Organic Matter (%) (Calc)	Air Dried & Ground



Project No: 22100077 Date Issued: 14/10/2022

Result Report Notes

Letters alongside results signify that the result has associated report notes. The report notes are as follows:

Letter No	te
-----------	----

- A Due to the matrix of the sample the laboratory has had to deviate from our standard protocols to be able to process the sample and provide a result. Where applicable the accreditation has been removed and this should be taken into consideration when utilising the data.
- B The QC associated with this result has not wholly met the QMS requirements, the accreditation has therefore been removed. However, the Laboratory has confidence in the performance of the method as a whole and that the integrity of the data has not been significantly compromised.
- Due to matrix interference, the internal standard and/or surrogate has not met the QMS requirements. This should be taken into consideration when utilising the data.
- D A non-standard volume or mass has been used for this test which has resulted in a raised detection limit.
- E Due to the parameter value being beyond our calibration range (and following the maximum size of dilution allowed, where applicable), the result cannot be quantified and as such the result will appear as a greater than symbol (>) with the accreditation removed. This data should be used for indicative purposes only.
- F Based on the sample history, appearance and smell a dilution was applied prior to testing. Unfortunately, the result is either above (>) or below (<) our calibration range. Results above our calibration range have accreditation removed. The data should be used for indicative purposes only.
- G The day 5 oxygen reading was below the capability of the instrument to detect, and therefore the calculated BOD has been reported unaccredited for guidance purposes only.

HWOL Acronym Key

<u>Acronym</u> <u>Description</u>

HS Headspace Analysis

EH Extractable Hydrocarbons - i.e everything extracted by the solvent(s)

CU Clean up - e.g. by florisil, silica gel
1D GC - Single coil gas chromatography

Total Aliphatics & Aromatics

AL Aliphatics only AR Aromatics only

+ Operator to indicate cumulative e.g. EH_CU+HS_1D_Total



Project No: 22100077 Date Issued: 14/10/2022

Additional Information

This report refers to samples as received. SOCOTEC UK Ltd takes no responsibility for accuracy or competence of sampling by others.

Results within this report relate only to the samples tested.

The accreditation codes are as follows:

U = UKAS accredited analysis M = MCERT accredited analysis N = Unaccredited analysis

Any units marked with ^ signify results are reported on a dry weight basis of 35 ° C.

All Air Dried and Ground Samples (ADG) are oven dried at less than 35° c.

This report shall not be reproduced except in full, without written approval of the laboratory.

Opinions and interpretations given are outside the scope of our UKAS accreditation.

Any samples marked with * are not covered by our scope of UKAS accreditation. If applicable, further report notes have been added.

Any solid samples where the Major Constituents are not one of the following (Sand, Silt, Clay, Made Ground) are not one of our accredited matrix types.

Any samples marked with ‡ have had MCERTS accreditation removed for this result

Any samples marked with a tick in the deviant table is deviant for the specific reason.

Any samples reported as IS, NA, ND mean the following:

IS = Insufficient Sample to complete analysis

NA = Sample is not amenable for the required analysis

ND = Results cannot be determined

Items listed with a 'SUB' method code prefix have been carried out by an external subcontracted laboratory.

Our deviating sample report does not include deviancy information for Subcontracted analysis. Please see the report from the subcontracted lab for information regarding any deviancies for this analysis.

Summaries of analysis methods are available upon request.

End of Certificate of Analysis



Environmental Chemistry

Certificate of Analysis

Client: SOCOTEC Geotechnical

Project: 22100078

Quote: BEC221027085 V1.1

Project Ref: F2033-22

Site: F2033-22 Crowle

Contact:

Address: Geotechnical House

18-19 Drome Road

Deeside Flintshire CH5 2NY

E-Mail: @socotec.com

Phone:

No. Samples Received: 1

Date Received: 03/10/2022

Analysis Date: 14/10/2022

Date Issued: 14/10/2022

Report Type: Final Version 01

This report supersedes any versions previously issued by the laboratory



SOCOTEC Environmental Chemistry, Bretby Business Park, Ashby Road, Burton-Upon-Trent, DE15 0YZ



Project No: 22100078 Date Issued: 14/10/2022

Samples Analysed

Text ID	Sample Reference	Sampling Date	Sample Type	Sample Description
22100078-001	WS07-A-3-ES-0.80	27/09/2022 11:30:00	SOLID	Soil Sample



Project No: 22100078

Date Issued: 14/10/2022

			s	ample ID	001
			Cus	tomer ID	WS07-A-3-ES-0.80
			Sam	ple Type	SOLID
			Samp	ling Date	27/09/2022
Analysis	Method Code	MDL	Units	Accred.	
pH (2.5:1 extraction)	PHSOIL	1	pH units	UM	8.1
Conductivity in 5:1 Water Extract	TSCONW	10	μS/cm	N	210
Chloride as Cl	KONECL	2	mg/kg^	N	182
Chromium (VI) as Cr	KONENS	0.1	mg/kg^	N	<0.1
Complex Cyanide	SFAPI	0.5	mg/kg^	UM	<0.5
Free Cyanide	SFAPI	0.5	mg/kg^	UM	<0.5
Sulphide as S	SFAPI	0.5	mg/kg^	N	<0.5
Total Cyanide	SFAPI	0.5	mg/kg^	UM	<0.5
Soil Organic Matter	WSLM59	0.04	% m/m^	U	0.28
Arsenic as As	ICPMSS	0.3	mg/kg^	UM	1.6
Cadmium as Cd	ICPMSS	0.2	mg/kg^	UM	0.2
Copper as Cu	ICPMSS	1.6	mg/kg^	UM	9.2
Lead as Pb	ICPMSS	0.7	mg/kg^	UM	6.2
Mercury as Hg	ICPMSS	0.5	mg/kg^	UM	<0.5
Nickel as Ni	ICPMSS	2	mg/kg^	UM	7.7
Selenium as Se	ICPMSS	0.5	mg/kg^	UM	<0.5
Total Chromium as Cr	ICPMSS	1.2	mg/kg^	UM	6.2
Vanadium as V	ICPMSS	0.6	mg/kg^	N	4.4
Zinc as Zn	ICPMSS	16	mg/kg^	UM	34.6







Project No: 22100078

Date Issued: 14/10/2022

			Sample ID	001	
			Cus	stomer ID	WS07-A-3-ES-0.80
			San	nple Type	SOLID
			Samp	ling Date	27/09/2022
Analysis	Method Code	MDL	Units	Accred.	
Boron as B	ICPBOR	0.5	mg/kg^	UM	0.6
Water Soluble Sulphate as SO4 by Mass	ICPWSS	20	mg/kg^	UM	70
Acid Soluble Sulphate as SO4	ICPACIDS	20	mg/kg^	UM	128
Acenaphthene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Acenaphthylene	PAHMSUS	0.08	mg/kg^	U	<0.09
Anthracene	PAHMSUS	0.08	mg/kg^	U	<0.09
Benzo[a]anthracene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Benzo[a]pyrene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Benzo[b]fluoranthene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Benzo[g,h,i]perylene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Benzo[k]fluoranthene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Chrysene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Coronene	PAHMSUS	0.08	mg/kg^	N	<0.09
Dibenzo[a,h]anthracene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Fluoranthene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Fluorene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Indeno[1,2,3-cd]pyrene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Naphthalene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Phenanthrene	PAHMSUS	0.08	mg/kg^	UM	<0.09







Project No: 22100078

Date Issued: 14/10/2022

			Sa	mple ID	001
			Cust	omer ID	WS07-A-3-ES-0.80
			Samı	ole Type	SOLID
			Sampli	ng Date	27/09/2022
Analysis	Method Code	MDL	Units	Accred.	
Pyrene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Total PAH 16	PAHMSUS	1.28	mg/kg^	U	<1.40
Total Moisture at 35°C	CLANDPREP	0.1	%	N	8.4
Description of Solid Material	CLANDPREP		-	N	SAND
Redox Potential	SUB016		mV	N	269.12
Asbestos Identification	SUB020		-	N	NAIIS







CERTIFICATE OF ANALYSIS

NALYSIS REQUESTED BY:

SOCOTEC UK Ltd

Environmental Chemistry

Po Box 100

Burton upon Trent

Staffordshire

DE15 0XD

CONTRACT NO: \$28298-6

DATE OF ISSUE: 12.10.22

DATE SAMPLES RECEIVED: 05.10.22

DATE ANALYSIS COMPLETED: 11.10.22

DESCRIPTION: One soil/loose aggregate sample weighing approximately 1.8kg.

ANALYSIS REQUESTED: Qualitative and quantitative analysis of a soil/loose aggregate sample for

mass determination of asbestos.

METHODS:

Qualitative - The sample was analysed qualitatively for asbestos by polarised light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative - The analysis was carried out using our documented in-house method based on HSE Contract Research Report No. 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies *et al*, 1996) and HSG 248. Our method includes initial examination of the entire sample, detailed analysis of a representative sub-sample and quantification by hand picking/weighing and/or fibre counting/sizing as appropriate.

RESULTS:

Initial Screening

No asbestos was detected in the soil sample by stereo-binocular and polarised light microscopy.

A summary of the results is given in Table 1.

Page 1 of 2



w.iom-world.org

ered Address: Research Avenue North, Riccarton, Edinburgh, EH14 4AP, United Kingdom 31 449 8000 Fats 010 449 8084 Email: iom@iom-world.org 0131 449 8000



CONTRACT NO: \$28298-6 **DATE OF ISSUE:** 12.10.22

RESULTS: (cont.)

Table 1: Qualitative Results

SOCOTEC Job I.D: 22100078

111				
IOM sample	SOCOTEC	Client Sample ID	ACM type	PLM result
number	Sample ID		detected	
528298-13	22100078-001	W\$07-A-3-ES-0.80	-	No Asbestos Detected

Our detection limit for this method is 0.001%.

COMMENTS:

OM Consulting cannot accept responsibility for samples that have been incorrectly collected or despatched by external clients.

Any opinions and interpretations expressed herein are out with the scope of our UKAS accreditation.





Element Materials Technology

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W: www.element.com

Socotec ESG ESG House, Bretby Business Park Bretby Burton upon Trent

Attention:

Date: 7th October, 2022

Your reference: 22100078

Our reference: Test Report 22/16219 Batch 1

Location: F2033-22-Crowle

Date samples received: 5th October, 2022

Status: Final Report

Issue:

One sample was received for analysis on 5th October, 2022 and was scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.



Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Socotec

 Reference:
 22100078

 Location:
 F2033-22-Crowle

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Contact: 22/16219

EMI JOD NO:	22/16219							
EMT Sample No.	1							
Sample ID	WS07-A-3-ES- 0.80							
Depth	0.80					5.		
COC No / misc						Please se abbrevi	e attached no ations and ac	otes for all pronyms
Containers								
Sample Date	27/09/2022							
Sample Type	Soil							
Batch Number	1					LOD/LOR	Units	Method
Date of Receipt	05/10/2022					LOD/LOR	Ullis	No.
Redox Potential	269.12						mV	TM139/PM0

Client Name: Socotec Reference: 22100078

Location: F2033-22-Crowle

Contact:

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason						
	No deviating sample report results for job 22/16219											

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 22/16219

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

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It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCI (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

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STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

EMT Job No.: 22/16219

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
В	Indicates analyte found in associated method blank.
DR	Dilution required.
М	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
со	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
ТВ	Trip Blank Sample
ОС	Outside Calibration Range

Element Materials Technology

Method Code Appendix

EMT Job No: 22/16219

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM139	ASTM G200-09 (2014) Oxidation-Reduction potential of soil samples removed from the ground, using Redox probe and meter.	PM0	No preparation is required.			AR	No



Project No: 22100078

Date Issued: 14/10/2022

Deviating Sample Report

All samples received in an appropriate condition with no deviancies noted with the samples.

Analysis Method

Method Code	Method Description	Analysis Method
CLANDPREP	Basic Solid Description	As Received
CLANDPREP	DW35 - CLand Prep and Dry Weight Correction to 35°C	As Received
ICPACIDS	Sulphate as SO4 (Acid Soluble)	Air Dried & Ground
ICPBOR	Boron (Water Soluble) by ICPOES	Air Dried & Ground
ICPMSS	Arsenic in Solids by ICPMS	Air Dried & Ground
ICPMSS	Cadmium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Chromium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Copper in Solids by ICPMS	Air Dried & Ground
ICPMSS	Lead in Solids by ICPMS	Air Dried & Ground
ICPMSS	Mercury in Solids by ICPMS	Air Dried & Ground
ICPMSS	Nickel in Solids by ICPMS	Air Dried & Ground
ICPMSS	Selenium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Vanadium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Zinc in Solids by ICPMS	Air Dried & Ground
ICPWSS	Sulphate as SO4 (Water Soluble)	Air Dried & Ground
KONECL	Chloride (2:1) by Colorimetry	Air Dried & Ground
KONENS	Chromium VI (Hexavalent) by Colorimetry	Air Dried & Ground
PAHMSUS	17 PAHs (inc. Coronene) by GCMS	As Received
PHSOIL	pH (2.5:1)	As Received
SFAPI	Cyanide (Complex) by SFA	As Received
SFAPI	Cyanide (Free) by SFA	As Received
SFAPI	Cyanide (Total) by SFA	As Received
SFAPI	Sulphide by SFA	As Received
SUB016	Redox Potential in Soil	
SUB020	Asbestos Stage 1 (with Stage 2+3 Trigger)	
TSCONW	Electrical Conductivity (5:1)	Air Dried & Ground
WSLM59	SOM: Soil Organic Matter (%) (Calc)	Air Dried & Ground



Project No: 22100078 Date Issued: 14/10/2022

Result Report Notes

Letters alongside results signify that the result has associated report notes. The report notes are as follows:

Letter No	te
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- A Due to the matrix of the sample the laboratory has had to deviate from our standard protocols to be able to process the sample and provide a result. Where applicable the accreditation has been removed and this should be taken into consideration when utilising the data.
- B The QC associated with this result has not wholly met the QMS requirements, the accreditation has therefore been removed. However, the Laboratory has confidence in the performance of the method as a whole and that the integrity of the data has not been significantly compromised.
- C Due to matrix interference, the internal standard and/or surrogate has not met the QMS requirements. This should be taken into consideration when utilising the data.
- D A non-standard volume or mass has been used for this test which has resulted in a raised detection limit.
- E Due to the parameter value being beyond our calibration range (and following the maximum size of dilution allowed, where applicable), the result cannot be quantified and as such the result will appear as a greater than symbol (>) with the accreditation removed. This data should be used for indicative purposes only.
- F Based on the sample history, appearance and smell a dilution was applied prior to testing. Unfortunately, the result is either above (>) or below (<) our calibration range. Results above our calibration range have accreditation removed. The data should be used for indicative purposes only.
- G The day 5 oxygen reading was below the capability of the instrument to detect, and therefore the calculated BOD has been reported unaccredited for guidance purposes only.

HWOL Acronym Key

<u>Acronym</u> <u>Description</u>

HS Headspace Analysis

EH Extractable Hydrocarbons - i.e everything extracted by the solvent(s)

CU Clean up - e.g. by florisil, silica gel
1D GC - Single coil gas chromatography

Total Aliphatics & Aromatics

AL Aliphatics only AR Aromatics only

+ Operator to indicate cumulative e.g. EH_CU+HS_1D_Total



Project No: 22100078 Date Issued: 14/10/2022

Additional Information

This report refers to samples as received. SOCOTEC UK Ltd takes no responsibility for accuracy or competence of sampling by others.

Results within this report relate only to the samples tested.

The accreditation codes are as follows:

U = UKAS accredited analysis M = MCERT accredited analysis N = Unaccredited analysis

Any units marked with ^ signify results are reported on a dry weight basis of 35 ° C.

All Air Dried and Ground Samples (ADG) are oven dried at less than 35° c.

This report shall not be reproduced except in full, without written approval of the laboratory.

Opinions and interpretations given are outside the scope of our UKAS accreditation.

Any samples marked with * are not covered by our scope of UKAS accreditation. If applicable, further report notes have been added.

Any solid samples where the Major Constituents are not one of the following (Sand, Silt, Clay, Made Ground) are not one of our accredited matrix types.

Any samples marked with ‡ have had MCERTS accreditation removed for this result

Any samples marked with a tick in the deviant table is deviant for the specific reason.

Any samples reported as IS, NA, ND mean the following:

IS = Insufficient Sample to complete analysis

NA = Sample is not amenable for the required analysis

ND = Results cannot be determined

Items listed with a 'SUB' method code prefix have been carried out by an external subcontracted laboratory.

Our deviating sample report does not include deviancy information for Subcontracted analysis. Please see the report from the subcontracted lab for information regarding any deviancies for this analysis.

Summaries of analysis methods are available upon request.

End of Certificate of Analysis



Environmental Chemistry

Certificate of Analysis

Client: SOCOTEC Geotechnical

Project: 22100145

Quote: BEC221027085 V1.1

Project Ref: F2033-22

Site: F2033-22 crowle

Contact:

Address: Geotechnical House

18-19 Drome Road

Deeside Flintshire CH5 2NY

E-Mail: @socotec.com

Phone:

No. Samples Received: 2

Date Received: 04/10/2022

Analysis Date: 19/10/2022

Date Issued: 19/10/2022

Report Type: Final Version 01

This report supersedes any versions previously issued by the laboratory



SOCOTEC Environmental Chemistry, Bretby Business Park, Ashby Road, Burton-Upon-Trent, DE15 0YZ



Project No: 22100145 Date Issued: 19/10/2022

Samples Analysed

Text ID	Sample Reference	Sampling Date	Sample Type	Sample Description
22100145-001	BH02-E-2-ES-0.40	30/09/2022 11:05:00	SOLID	Soil Sample
22100145-002	BH02-E-4-ES-1.00	30/09/2022 11:15:00	SOLID	Soil Sample



Project No: 22100145

Date Issued: 19/10/2022

	001	002				
			Cus	tomer ID	BH02-E-2-ES-0.40	BH02-E-4-ES-1.00
			Sam	ple Type	SOLID	SOLID
			Samp	ling Date	30/09/2022	30/09/2022
Analysis	Method Code	MDL	Units	Accred.		
pH (2.5:1 extraction)	PHSOIL	1	pH units	UM	8.9	8.1
Conductivity in 5:1 Water Extract	TSCONW	10	μS/cm	N	689	229
Chloride as Cl	KONECL	2	mg/kg^	N	621	247
Chromium (VI) as Cr	KONENS	0.1	mg/kg^	N	<0.1	<0.1
Complex Cyanide	SFAPI	0.5	mg/kg^	UM	<0.6	<0.6
Free Cyanide	SFAPI	0.5	mg/kg^	UM	<0.6	<0.6
Sulphide as S	SFAPI	0.5	mg/kg^	N	2.5	<0.6
Total Cyanide	SFAPI	0.5	mg/kg^	UM	<0.6	<0.6
Soil Organic Matter	WSLM59	0.04	% m/m^	U	2.81	0.53
Arsenic as As	ICPMSS	0.3	mg/kg^	UM	21.9	24.0
Cadmium as Cd	ICPMSS	0.2	mg/kg^	UM	0.4	<0.2
Copper as Cu	ICPMSS	1.6	mg/kg^	UM	21.1	21.1
Lead as Pb	ICPMSS	0.7	mg/kg^	UM	63.1	54.0
Mercury as Hg	ICPMSS	0.5	mg/kg^	UM	<0.5	<0.5
Nickel as Ni	ICPMSS	2	mg/kg^	UM	27.6	19.9
Selenium as Se	ICPMSS	0.5	mg/kg^	UM	<0.5	<0.5
Total Chromium as Cr	ICPMSS	1.2	mg/kg^	UM	47.2	35.5
Vanadium as V	ICPMSS	0.6	mg/kg^	N	87.0	63.7
Zinc as Zn	ICPMSS	16	mg/kg^	UM	102.4	70.0







Project No: 22100145

Date Issued: 19/10/2022

			001	002		
			Cus	tomer ID	BH02-E-2-ES-0.40	BH02-E-4-ES-1.00
			San	ple Type	SOLID	SOLID
			Samp	ling Date	30/09/2022	30/09/2022
Analysis	Method Code	MDL	Units	Accred.		
Boron as B	ICPBOR	0.5	mg/kg^	UM	2.3	<0.5
Water Soluble Sulphate as SO4 by Mass	ICPWSS	20	mg/kg^	UM	2700	582
Acid Soluble Sulphate as SO4	ICPACIDS	20	mg/kg^	UM	1210	166
Acenaphthene	PAHMSUS	0.08	mg/kg^	UM	35.8	<0.09
Acenaphthylene	PAHMSUS	0.08	mg/kg^	U	13.6	<0.09
Anthracene	PAHMSUS	0.08	mg/kg^	U	70.9	<0.09
Benzo[a]anthracene	PAHMSUS	0.08	mg/kg^	UM	77.8	0.10
Benzo[a]pyrene	PAHMSUS	0.08	mg/kg^	UM	78.8	0.13
Benzo[b]fluoranthene	PAHMSUS	0.08	mg/kg^	UM	73.1	0.12
Benzo[g,h,i]perylene	PAHMSUS	0.08	mg/kg^	UM	36.3	<0.09
Benzo[k]fluoranthene	PAHMSUS	0.08	mg/kg^	UM	35.2	<0.09
Chrysene	PAHMSUS	0.08	mg/kg^	UM	72.8	<0.09
Coronene	PAHMSUS	0.08	mg/kg^	N	9.92	<0.09
Dibenzo[a,h]anthracene	PAHMSUS	0.08	mg/kg^	UM	11.7	<0.09
Fluoranthene	PAHMSUS	0.08	mg/kg^	UM	219	<0.09
Fluorene	PAHMSUS	0.08	mg/kg^	UM	42.2	<0.09
Indeno[1,2,3-cd]pyrene	PAHMSUS	0.08	mg/kg^	UM	39.2	<0.09
Naphthalene	PAHMSUS	0.08	mg/kg^	UM	18.6	<0.09
Phenanthrene	PAHMSUS	0.08	mg/kg^	UM	215	<0.09







Project No: 22100145

Date Issued: 19/10/2022

	Sample ID				001	002
			Cus	tomer ID	BH02-E-2-ES-0.40	BH02-E-4-ES-1.00
			Sam	ple Type	SOLID	SOLID
			Sampling Date		30/09/2022	30/09/2022
Analysis	Method Code	MDL	Units	Accred.		
Pyrene	PAHMSUS	0.08	mg/kg^	UM	179	<0.09
Total PAH 16	PAHMSUS	1.28	mg/kg^	U	1220	1.53
Total Moisture at 35°C	CLANDPREP	0.1	%	N	9.4	12.4
Description of Solid Material	CLANDPREP		-	N	SILT	SAND
Redox Potential	SUB016		mV	N	300.82	281.42
Asbestos Identification	SUB020		-	N	NAIIS	NAIIS







CERTIFICATE OF ANALYSIS

YSIS REQUESTED BY:

SOCOTEC UK Ltd

Environmental Chemistry

PO Box 100 Burton upon Trent

Staffordshire **DE15 0XD**

CONTRACT NO: \$28298-10

DATE OF ISSUE:

12.10.22

DATE SAMPLES RECEIVED: 05.10.22

DATE ANALYSIS COMPLETED: 11.10.22

DESCRIPTION: Two soil/loose aggregate samples each weighing approximately 1.5-1.6kg.

NALYSIS REQUESTED: Qualitati√e and quantitative analysis of soil/loose aggregate samples for

mass determination of asbestos.

METHODS:

Qualitative - The samples were analysed qualitatively for asbestos by polarised light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative - The analysis was carried out using our documented in-house method based on HSE Contract Research Report No. 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire sample, detailed analysis of a representative sub-sample and quantification by hand picking/weighing and/or fibre counting/sizing as appropriate.

RESULTS:

Initial Screening

No asbestos was detected in either of the soil samples by stereo-binocular and polarised light microscopy.

A summary of the results is given in Table 1.

Page 1 of 2





CONTRACT NO: \$28298-10 **DATE OF ISSUE:** 12.10.22

RESULTS: (cont.)

iii elu

Table 1: Qualitative Results

SOCOTEC Job I.D: 22100145

IOM sample number	SOCOTED Sample ID	Client Sample ID	ACM type detected	PLM result
S28298-36	22100145-001	BH02-E-2-ES-0.40	-	No Asbestos Detected
S28298-37	22100145-002	BH02-E-4-ES-1.00	-	No Asbestos Detected

Our detection limit for this method is 0.001%.

COMMENTS:

IOM Consulting cannot accept responsibility for samples that have been incorrectly collected or despatched by external clients.

Any opinions and interpretations expressed herein are out with the scope of our UKAS accreditation.



Wat



Element Materials Technology

Unit 3 Deeside Point

Zone 3

Deeside Industrial Park

Deeside CH5 2UA P: +44 (0) 1244 833780

F: +44 (0) 1244 833781

W: www.element.com

Socotec ESG ESG House, Bretby Business Park Bretby Burton upon Trent

Attention:

Date: 7th October, 2022

Your reference: 22100145

Our reference : Test Report 22/16214 Batch 1

Location : F2033-22 Crowle

Date samples received : 5th October, 2022

Status: Final Report

Issue:

Two samples were received for analysis on 5th October, 2022 of which two were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.



Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Socotec

 Reference:
 22100145

 Location:
 F2033-22 Crowle

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Report : Solid

Contact: EMT Job No: 22/16214

EMT Job No:	22/16214		 	 	 	 	-		
EMT Sample No.	1	2							
Sample ID	BH02-E-2-ES- 0.40	BH02-E-2-ES- 1.00							
Depth	0.40	1.00							
COC No / misc		1.00					Please se abbrevi	e attached no ations and ac	otes for all cronyms
Containers	J	J							
Sample Date									
Sample Type	Soil	Soil							
Batch Number	1	1							Method
Date of Receipt	05/10/2022	05/10/2022					LOD/LOR	Units	No.
Redox Potential	300.82	281.42						mV	TM139/PM0

Client Name: Socotec Reference: 22100145

Location: F2033-22 Crowle **Contact:** Chem Subcon

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason				
	No deviating sample report results for job 22/16214									

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 22/16214

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All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

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Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCI (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

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As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

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Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

EMT Job No.: 22/16214

NOTE

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Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
В	Indicates analyte found in associated method blank.
DR	Dilution required.
М	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
со	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
ТВ	Trip Blank Sample
ОС	Outside Calibration Range

Element Materials Technology

Method Code Appendix

EMT Job No: 22/16214

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
ТМ139	ASTM G200-09 (2014) Oxidation-Reduction potential of soil samples removed from the ground, using Redox probe and meter.	PM0	No preparation is required.			AR	No



Project No: 22100145

Date Issued: 19/10/2022

Deviating Sample Report

All samples received in an appropriate condition with no deviancies noted with the samples.

Analysis Method

Method Code	Method Description	Analysis Method
CLANDPREP	Basic Solid Description	As Received
CLANDPREP	DW35 - CLand Prep and Dry Weight Correction to 35°C	As Received
ICPACIDS	Sulphate as SO4 (Acid Soluble)	Air Dried & Ground
ICPBOR	Boron (Water Soluble) by ICPOES	Air Dried & Ground
ICPMSS	Arsenic in Solids by ICPMS	Air Dried & Ground
ICPMSS	Cadmium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Chromium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Copper in Solids by ICPMS	Air Dried & Ground
ICPMSS	Lead in Solids by ICPMS	Air Dried & Ground
ICPMSS	Mercury in Solids by ICPMS	Air Dried & Ground
ICPMSS	Nickel in Solids by ICPMS	Air Dried & Ground
ICPMSS	Selenium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Vanadium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Zinc in Solids by ICPMS	Air Dried & Ground
ICPWSS	Sulphate as SO4 (Water Soluble)	Air Dried & Ground
KONECL	Chloride (2:1) by Colorimetry	Air Dried & Ground
KONENS	Chromium VI (Hexavalent) by Colorimetry	Air Dried & Ground
PAHMSUS	17 PAHs (inc. Coronene) by GCMS	As Received
PHSOIL	pH (2.5:1)	As Received
SFAPI	Cyanide (Complex) by SFA	As Received
SFAPI	Cyanide (Free) by SFA	As Received
SFAPI	Cyanide (Total) by SFA	As Received
SFAPI	Sulphide by SFA	As Received
SUB016	Redox Potential in Soil	
SUB020	Asbestos Stage 1 (with Stage 2+3 Trigger)	
TSCONW	Electrical Conductivity (5:1)	Air Dried & Ground
WSLM59	SOM: Soil Organic Matter (%) (Calc)	Air Dried & Ground



Project No: 22100145 Date Issued: 19/10/2022

Result Report Notes

Letters alongside results signify that the result has associated report notes. The report notes are as follows:

Letter No	te
-----------	----

- A Due to the matrix of the sample the laboratory has had to deviate from our standard protocols to be able to process the sample and provide a result. Where applicable the accreditation has been removed and this should be taken into consideration when utilising the data.
- B The QC associated with this result has not wholly met the QMS requirements, the accreditation has therefore been removed. However, the Laboratory has confidence in the performance of the method as a whole and that the integrity of the data has not been significantly compromised.
- Due to matrix interference, the internal standard and/or surrogate has not met the QMS requirements. This should be taken into consideration when utilising the data.
- D A non-standard volume or mass has been used for this test which has resulted in a raised detection limit.
- E Due to the parameter value being beyond our calibration range (and following the maximum size of dilution allowed, where applicable), the result cannot be quantified and as such the result will appear as a greater than symbol (>) with the accreditation removed. This data should be used for indicative purposes only.
- F Based on the sample history, appearance and smell a dilution was applied prior to testing. Unfortunately, the result is either above (>) or below (<) our calibration range. Results above our calibration range have accreditation removed. The data should be used for indicative purposes only.
- G The day 5 oxygen reading was below the capability of the instrument to detect, and therefore the calculated BOD has been reported unaccredited for guidance purposes only.

HWOL Acronym Key

<u>Acronym</u> <u>Description</u>

HS Headspace Analysis

EH Extractable Hydrocarbons - i.e everything extracted by the solvent(s)

CU Clean up - e.g. by florisil, silica gel
1D GC - Single coil gas chromatography

Total Aliphatics & Aromatics

AL Aliphatics only AR Aromatics only

+ Operator to indicate cumulative e.g. EH_CU+HS_1D_Total



Project No: 22100145 Date Issued: 19/10/2022

Additional Information

This report refers to samples as received. SOCOTEC UK Ltd takes no responsibility for accuracy or competence of sampling by others.

Results within this report relate only to the samples tested.

The accreditation codes are as follows:

U = UKAS accredited analysis M = MCERT accredited analysis N = Unaccredited analysis

Any units marked with ^ signify results are reported on a dry weight basis of 35 ° C.

All Air Dried and Ground Samples (ADG) are oven dried at less than 35° c.

This report shall not be reproduced except in full, without written approval of the laboratory.

Opinions and interpretations given are outside the scope of our UKAS accreditation.

Any samples marked with * are not covered by our scope of UKAS accreditation. If applicable, further report notes have been added.

Any solid samples where the Major Constituents are not one of the following (Sand, Silt, Clay, Made Ground) are not one of our accredited matrix types.

Any samples marked with ‡ have had MCERTS accreditation removed for this result

Any samples marked with a tick in the deviant table is deviant for the specific reason.

Any samples reported as IS, NA, ND mean the following:

IS = Insufficient Sample to complete analysis

NA = Sample is not amenable for the required analysis

ND = Results cannot be determined

Items listed with a 'SUB' method code prefix have been carried out by an external subcontracted laboratory.

Our deviating sample report does not include deviancy information for Subcontracted analysis. Please see the report from the subcontracted lab for information regarding any deviancies for this analysis.

Summaries of analysis methods are available upon request.

End of Certificate of Analysis



Environmental Chemistry

Certificate of Analysis

Client: SOCOTEC Geotechnical

Project: 22100355

Quote: BEC221027085 V1.1

Project Ref: F2033-22

Site: F2033-22 crowle

Contact:

Address: Geotechnical House

18-19 Drome Road

Deeside Flintshire CH5 2NY

E-Mail:

Phone:

No. Samples Received: 1

Date Received: 06/10/2022

Analysis Date: 17/10/2022

Date Issued: 17/10/2022

Report Type: Final Version 01

This report supersedes any versions previously issued by the laboratory



SOCOTEC Environmental Chemistry, Bretby Business Park, Ashby Road, Burton-Upon-Trent, DE15 0YZ



Project No: 22100355 Date Issued: 17/10/2022

Samples Analysed

Text ID	Sample Reference	Sampling Date	Sample Type	Sample Description
22100355-001	WS02-W-1-ES-0.30	04/10/2022 09:55:00	SOLID	Soil Sample



Project No: 22100355

Date Issued: 17/10/2022

			S	ample ID	001
			Cus	tomer ID	WS02-W-1-ES-0.30
			Sam	ple Type	SOLID
			Sampl	ing Date	04/10/2022
Analysis	Method Code	MDL	Units	Accred.	
pH (2.5:1 extraction)	PHSOIL	1	pH units	UM	7.9
Conductivity in 5:1 Water Extract	TSCONW	10	μS/cm	N	550
Chloride as Cl	KONECL	2	mg/kg^	N	136
Chromium (VI) as Cr	KONENS	0.1	mg/kg^	N	<0.1
Complex Cyanide	SFAPI	0.5	mg/kg^	UM	<0.6
Free Cyanide	SFAPI	0.5	mg/kg^	UM	<0.6
Sulphide as S	SFAPI	0.5	mg/kg^	N	1.0
Total Cyanide	SFAPI	0.5	mg/kg^	UM	<0.6
Soil Organic Matter	WSLM59	0.04	% m/m^	U	8.16
Arsenic as As	ICPMSS	0.3	mg/kg^	UM	5.9
Cadmium as Cd	ICPMSS	0.2	mg/kg^	UM	<0.2
Copper as Cu	ICPMSS	1.6	mg/kg^	UM	9.1
Lead as Pb	ICPMSS	0.7	mg/kg^	UM	12.5
Mercury as Hg	ICPMSS	0.5	mg/kg^	UM	<0.5
Nickel as Ni	ICPMSS	2	mg/kg^	UM	20.7
Selenium as Se	ICPMSS	0.5	mg/kg^	UM	<0.5
Total Chromium as Cr	ICPMSS	1.2	mg/kg^	UM	10.6
Vanadium as V	ICPMSS	0.6	mg/kg^	N	13.4
Zinc as Zn	ICPMSS	16	mg/kg^	UM	75.2







Project No: 22100355

Date Issued: 17/10/2022

			S	ample ID	001
			Cus	tomer ID	WS02-W-1-ES-0.30
			Sam	ple Type	SOLID
			Sampl	ing Date	04/10/2022
Analysis	Method Code	MDL	Units	Accred.	
Boron as B	ICPBOR	0.5	mg/kg^	UM	2.7
Water Soluble Sulphate as SO4 by Mass	ICPWSS	20	mg/kg^	UM	759
Acid Soluble Sulphate as SO4	ICPACIDS	20	mg/kg^	UM	2280
Acenaphthene	PAHMSUS	0.08	mg/kg^	UM	0.46
Acenaphthylene	PAHMSUS	0.08	mg/kg^	U	1.17
Anthracene	PAHMSUS	0.08	mg/kg^	U	3.11
Benzo[a]anthracene	PAHMSUS	0.08	mg/kg^	UM	16.9
Benzo[a]pyrene	PAHMSUS	0.08	mg/kg^	UM	16.5
Benzo[b]fluoranthene	PAHMSUS	0.08	mg/kg^	UM	18.7
Benzo[g,h,i]perylene	PAHMSUS	0.08	mg/kg^	UM	9.20
Benzo[k]fluoranthene	PAHMSUS	0.08	mg/kg^	UM	7.51
Chrysene	PAHMSUS	0.08	mg/kg^	UM	14.9
Coronene	PAHMSUS	0.08	mg/kg^	N	2.63
Dibenzo[a,h]anthracene	PAHMSUS	0.08	mg/kg^	UM	2.43
Fluoranthene	PAHMSUS	0.08	mg/kg^	UM	34.4
Fluorene	PAHMSUS	0.08	mg/kg^	UM	0.61
Indeno[1,2,3-cd]pyrene	PAHMSUS	0.08	mg/kg^	UM	9.46
Naphthalene	PAHMSUS	0.08	mg/kg^	UM	0.27
Phenanthrene	PAHMSUS	0.08	mg/kg^	UM	11.4







Project No: 22100355 Date Issued: 17/10/2022

			Sa	mple ID	001
			Cust	omer ID	WS02-W-1-ES-0.30
			Samp	ole Type	SOLID
			Sampli	ng Date	04/10/2022
Analysis	Method Code	MDL	Units	Accred.	
Pyrene	PAHMSUS	0.08	mg/kg^	UM	28.9
Total PAH 16	PAHMSUS	1.28	mg/kg^	U	176
Total Moisture at 35°C	CLANDPREP	0.1	%	N	9.4
Description of Solid Material	CLANDPREP		-	N	SILT
Redox Potential	SUB016		mV	N	323.39
Asbestos Identification	SUB020		-	N	NAIIS







CERTIFICATE OF ANALYSIS

ANALYSIS REQUESTED BY:

SOCOTEC UK Ltd

CONTRACT NO: \$28317-5

Environmental Chemistry

DATE OF ISSUE: 14.10.22

PO Box 100 **Burton upon Trent** Staffordshire **DE15 0XD**

DATE SAMPLES RECEIVED: 07.10.22

DATE ANALYSIS COMPLETED: 13.10.22

DESCRIPTION: One soil/loose aggregate sample weighing approximately 1.1kg.

ANALYSIS REQUESTED: Qualitative and quantitative analysis of a soil/loose aggregate sample for

mass determination of asbestos.

METHODS:

Qualitative - The sample was analysed qualitatively for asbestos by polarised light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative - The analysis was carried out using our documented in-house method based on HSE Contract Research Report No. 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire sample, detailed analysis of a representative sub-sample and quantification by hand picking/weighing and/or fibre counting/sizing as appropriate.

RESULTS:

Initial Screening

No asbestos was detected in the soil sample by stereo-binocular and polarised light microscopy.

A summary of the results is given in Table 1.



Tel: 0131 449 8000





CONTRACT NO: \$28317-5 **DATE OF ISSUE:** 14.10.22

RESULTS: (cont.)

Table 1: Qualitative Results

SOCOTEC Job I.D: 22100355

IOM sample number	SOCOTEC Sample ID	Client Sample ID	ACM type detected	PLM result
S28317-6	22100355-001	WS02-W-1-ES-0.30	-	No Asbestos Detected

Our detection limit for this method is 0,001%.

COMMENTS:

IOM Consulting cannot accept responsibility for samples that have been incorrectly collected or despatched by external clients.

Any opinions and interpretations expressed herein are out with the scope of our UKAS accreditation.





Element Materials Technology

Unit 3 Deeside Point

Zone 3

Deeside Industrial Park

Deeside CH5 2UA P: +44 (0) 1244 833780

F: +44 (0) 1244 833781

W: www.element.com

Socotec ESG ESG House, Bretby Business Park Bretby Burton upon Trent

Attention:

Date: 11th October, 2022

Your reference: 22100355

Our reference: Test Report 22/16415 Batch 1

Location: F2033-22 crowle

Date samples received : 7th October, 2022

Status: Final Report

Issue:

One sample was received for analysis on 7th October, 2022 and was scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.



Please include all sections of this report if it is reproduced

Element Materials Technology

Socotec Client Name:

22100355 Reference: F2033-22 crowle Location:

Contact:

22/16415 EMT Job No:

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EWIT JOB NO.	22/10+10							_		
EMT Sample No.	1									
Sample ID	22100355-001									
Depth	0.30							Please se	e attached n	otes for all
COC No / misc								abbrevi	ations and ad	cronyms
Containers	J									
Sample Date	04/10/2022									
Sample Type										
Batch Number								LOD/LOR	Units	Method No.
Date of Receipt										
Redox Potential	323.39								mV	TM139/PM0
	I .	I .		l .		l	I			

Client Name: Socotec Reference: 22100355

Location: F2033-22 crowle

Contact:

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
					No deviating sample report results for job 22/16415	

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 22/16415

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCI (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

EMT Job No.: 22/16415

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
В	Indicates analyte found in associated method blank.
DR	Dilution required.
М	MCERTS accredited.
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NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
со	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
ТВ	Trip Blank Sample
ОС	Outside Calibration Range

Element Materials Technology

Method Code Appendix

EMT Job No: 22/16415

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM139	ASTM G200-09 (2014) Oxidation-Reduction potential of soil samples removed from the ground, using Redox probe and meter.	PM0	No preparation is required.			AR	No



Project No: 22100355

Date Issued: 17/10/2022

Deviating Sample Report

All samples received in an appropriate condition with no deviancies noted with the samples.

Analysis Method

Method Code	Method Description	Analysis Method
CLANDPREP	Basic Solid Description	As Received
CLANDPREP	DW35 - CLand Prep and Dry Weight Correction to 35°C	As Received
ICPACIDS	Sulphate as SO4 (Acid Soluble)	Air Dried & Ground
ICPBOR	Boron (Water Soluble) by ICPOES	Air Dried & Ground
ICPMSS	Arsenic in Solids by ICPMS	Air Dried & Ground
ICPMSS	Cadmium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Chromium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Copper in Solids by ICPMS	Air Dried & Ground
ICPMSS	Lead in Solids by ICPMS	Air Dried & Ground
ICPMSS	Mercury in Solids by ICPMS	Air Dried & Ground
ICPMSS	Nickel in Solids by ICPMS	Air Dried & Ground
ICPMSS	Selenium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Vanadium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Zinc in Solids by ICPMS	Air Dried & Ground
ICPWSS	Sulphate as SO4 (Water Soluble)	Air Dried & Ground
KONECL	Chloride (2:1) by Colorimetry	Air Dried & Ground
KONENS	Chromium VI (Hexavalent) by Colorimetry	Air Dried & Ground
PAHMSUS	17 PAHs (inc. Coronene) by GCMS	As Received
PHSOIL	pH (2.5:1)	As Received
SFAPI	Cyanide (Complex) by SFA	As Received
SFAPI	Cyanide (Free) by SFA	As Received
SFAPI	Cyanide (Total) by SFA	As Received
SFAPI	Sulphide by SFA	As Received
SUB016	Redox Potential in Soil	
SUB020	Asbestos Stage 1 (with Stage 2+3 Trigger)	
TSCONW	Electrical Conductivity (5:1)	Air Dried & Ground
WSLM59	SOM: Soil Organic Matter (%) (Calc)	Air Dried & Ground



Project No: 22100355 Date Issued: 17/10/2022

Result Report Notes

Letters alongside results signify that the result has associated report notes. The report notes are as follows:

Letter No	te
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- A Due to the matrix of the sample the laboratory has had to deviate from our standard protocols to be able to process the sample and provide a result. Where applicable the accreditation has been removed and this should be taken into consideration when utilising the data.
- B The QC associated with this result has not wholly met the QMS requirements, the accreditation has therefore been removed. However, the Laboratory has confidence in the performance of the method as a whole and that the integrity of the data has not been significantly compromised.
- Due to matrix interference, the internal standard and/or surrogate has not met the QMS requirements. This should be taken into consideration when utilising the data.
- D A non-standard volume or mass has been used for this test which has resulted in a raised detection limit.
- E Due to the parameter value being beyond our calibration range (and following the maximum size of dilution allowed, where applicable), the result cannot be quantified and as such the result will appear as a greater than symbol (>) with the accreditation removed. This data should be used for indicative purposes only.
- F Based on the sample history, appearance and smell a dilution was applied prior to testing. Unfortunately, the result is either above (>) or below (<) our calibration range. Results above our calibration range have accreditation removed. The data should be used for indicative purposes only.
- G The day 5 oxygen reading was below the capability of the instrument to detect, and therefore the calculated BOD has been reported unaccredited for guidance purposes only.

HWOL Acronym Key

<u>Acronym</u> <u>Description</u>

HS Headspace Analysis

EH Extractable Hydrocarbons - i.e everything extracted by the solvent(s)

CU Clean up - e.g. by florisil, silica gel
1D GC - Single coil gas chromatography

Total Aliphatics & Aromatics

AL Aliphatics only AR Aromatics only

+ Operator to indicate cumulative e.g. EH_CU+HS_1D_Total



Project No: 22100355 Date Issued: 17/10/2022

Additional Information

This report refers to samples as received. SOCOTEC UK Ltd takes no responsibility for accuracy or competence of sampling by others.

Results within this report relate only to the samples tested.

The accreditation codes are as follows:

U = UKAS accredited analysis M = MCERT accredited analysis N = Unaccredited analysis

Any units marked with ^ signify results are reported on a dry weight basis of 35 ° C.

All Air Dried and Ground Samples (ADG) are oven dried at less than 35° c.

This report shall not be reproduced except in full, without written approval of the laboratory.

Opinions and interpretations given are outside the scope of our UKAS accreditation.

Any samples marked with * are not covered by our scope of UKAS accreditation. If applicable, further report notes have been added.

Any solid samples where the Major Constituents are not one of the following (Sand, Silt, Clay, Made Ground) are not one of our accredited matrix types.

Any samples marked with ‡ have had MCERTS accreditation removed for this result

Any samples marked with a tick in the deviant table is deviant for the specific reason.

Any samples reported as IS, NA, ND mean the following:

IS = Insufficient Sample to complete analysis

NA = Sample is not amenable for the required analysis

ND = Results cannot be determined

Items listed with a 'SUB' method code prefix have been carried out by an external subcontracted laboratory.

Our deviating sample report does not include deviancy information for Subcontracted analysis. Please see the report from the subcontracted lab for information regarding any deviancies for this analysis.

Summaries of analysis methods are available upon request.

End of Certificate of Analysis



Environmental Chemistry

Certificate of Analysis

Client: SOCOTEC Geotechnical

Project: 22100923

Quote: BEC220926768 V3.1

Project Ref: F2033-22

Site: F2033-22 crowle

Contact:

Address: Geotechnical House

18-19 Drome Road

Deeside Flintshire CH5 2NY

E-Mail: @socotec.com

Phone:

No. Samples Received: 2

Date Received: 13/10/2022

Analysis Date: 20/10/2022

Date Issued: 21/10/2022

Report Type: Final Version 01

This report supersedes any versions previously issued by the laboratory



SOCOTEC Environmental Chemistry, Bretby Business Park, Ashby Road, Burton-Upon-Trent, DE15 0YZ



Project No: 22100923

Date Issued: 21/10/2022

Samples Analysed

Text ID	Sample Reference	Sampling Date	Sample Type	Sample Description
22100923-001	WS06-A -9-ES-2.95	11/10/2022 11:41:00	SOLID	Soil Sample
22100923-002	WS06-A-3-ES-0.60	11/10/2022 11:00:00	SOLID	Soil Sample



Project No: 22100923

Date Issued: 21/10/2022

	001	002				
			Cus	tomer ID	WS06-A -9-ES-2.95	WS06-A-3-ES-0.60
			Sam	ple Type	SOLID	SOLID
			Samp	ling Date	11/10/2022	11/10/2022
Analysis	Method Code	MDL	Units	Accred.		
pH (2.5:1 extraction)	PHSOIL	1	pH units	U	6.4*	7.6
Soil Organic Matter	WSLM59	0.04	% m/m^	U	>36.8* E	0.71
Water Soluble Sulphate as SO4 2:1 Ext	ICPWSS	10	mg/l	U	1180*	47
Total Moisture at 35°C	CLANDPREP	0.1	%	N	65.1	11.2
Total Moisture at 35°C	CLANDPREP	0.1	%	N	65.1	11.2
Description of Solid Material	CLANDPREP		-	N	MISCELLANEOUS	SAND





Project No: 22100923 Date Issued: 21/10/2022

Deviating Sample Report

All samples received in an appropriate condition with no deviancies noted with the samples.

Analysis Method

Method Code Method Description Analysis Method **CLANDPREP Basic Solid Description** As Received **CLANDPREP** CLand Prep Dry Weight Content @ 35°C As Received DW35 - CLand Prep and Dry Weight Correction to 35°C **CLANDPREP** As Received **ICPWSS** Sulphate as SO4 (Water Soluble 2:1 Extract) Air Dried & Ground **PHSOIL** pH (2.5:1) As Received WSLM59 SOM: Soil Organic Matter (%) (Calc) Air Dried & Ground

Result Report Notes

Letters alongside results signify that the result has associated report notes. The report notes are as follows:

<u>Letter</u> <u>Note</u>

- A Due to the matrix of the sample the laboratory has had to deviate from our standard protocols to be able to process the sample and provide a result. Where applicable the accreditation has been removed and this should be taken into consideration when utilising the data.
- B The QC associated with this result has not wholly met the QMS requirements, the accreditation has therefore been removed. However, the Laboratory has confidence in the performance of the method as a whole and that the integrity of the data has not been significantly compromised.
- Due to matrix interference, the internal standard and/or surrogate has not met the QMS requirements. This should be taken into consideration when utilising the data.
- D A non-standard volume or mass has been used for this test which has resulted in a raised detection limit.
- E Due to the parameter value being beyond our calibration range (and following the maximum size of dilution allowed, where applicable), the result cannot be quantified and as such the result will appear as a greater than symbol (>) with the accreditation removed. This data should be used for indicative purposes only.
- F Based on the sample history, appearance and smell a dilution was applied prior to testing. Unfortunately, the result is either above (>) or below (<) our calibration range. Results above our calibration range have accreditation removed. The data should be used for indicative purposes only.
- G The day 5 oxygen reading was below the capability of the instrument to detect, and therefore the calculated BOD has been reported unaccredited for guidance purposes only.

HWOL Acronym Key

<u>Acronym</u> <u>Description</u>

HS Headspace Analysis

EH Extractable Hydrocarbons - i.e everything extracted by the solvent(s)

CU Clean up - e.g. by florisil, silica gel 1D GC - Single coil gas chromatography

Total Aliphatics & Aromatics
AL Aliphatics only
AR Aromatics only

AR Aromatics only

+ Operator to indicate cumulative e.g. EH_CU+HS_1D_Total



Project No: 22100923 Date Issued: 21/10/2022

Additional Information

This report refers to samples as received. SOCOTEC UK Ltd takes no responsibility for accuracy or competence of sampling by others.

Results within this report relate only to the samples tested.

The accreditation codes are as follows:

U = UKAS accredited analysis M = MCERT accredited analysis N = Unaccredited analysis

Any units marked with ^ signify results are reported on a dry weight basis of 35 ° C.

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Our deviating sample report does not include deviancy information for Subcontracted analysis. Please see the report from the subcontracted lab for information regarding any deviancies for this analysis.

Summaries of analysis methods are available upon request.

End of Certificate of Analysis



Environmental Chemistry

Certificate of Analysis

Client: SOCOTEC Geotechnical

Project: 22101067

Quote: BEC221027085 V1.1

Project Ref: F2033-22

Site: F2033-22

Contact:

Address: Geotechnical House

18-19 Drome Road

Deeside Flintshire CH5 2NY

E-Mail: @socotec.com

Phone:

No. Samples Received: 2

Date Received: 14/10/2022

Analysis Date: 28/10/2022

Date Issued: 28/10/2022

Report Type: Final Version 01

This report supersedes any versions previously issued by the laboratory



SOCOTEC Environmental Chemistry, Bretby Business Park, Ashby Road, Burton-Upon-Trent, DE15 0YZ



Project No: 22101067 Date Issued: 28/10/2022

Samples Analysed

Text ID	Sample Reference	Sampling Date	Sample Type	Sample Description
22101067-001	WS01-W-1-ES-0.30	12/10/2022 12:32:00	SOLID	Soil Sample
22101067-002	WS01-W-2-ES-0.80	12/10/2022 12:33:00	SOLID	Soil Sample



Project Name: F2033-22-F2033-22

Project No: 22101067

Date Issued: 28/10/2022

			Sa	ample ID	001	002	
			Cus	tomer ID	WS01-W-1-ES-0.30	WS01-W-2-ES-0.80	
			Sam	ple Type	SOLID	SOLID	
			Sampl	ing Date	12/10/2022	12/10/2022	
Analysis	Method Code	MDL	Units	Accred.			
pH (2.5:1 extraction)	PHSOIL	1	pH units	UM	6.8	7.5	
Conductivity in 5:1 Water Extract	TSCONW	10	μS/cm	N	216	268	
Chloride as Cl	KONECL	2	mg/kg^	N	30	94	
Chromium (VI) as Cr	KONENS	0.1	mg/kg^	N	<0.1	<0.1	
Complex Cyanide	SFAPI	0.5	mg/kg^	UM	<0.5	<0.7	
Free Cyanide	SFAPI	0.5	mg/kg^	UM	<0.5	1.4	
Sulphide as S	SFAPI	0.5	mg/kg^	N	<0.6	<0.7	
Total Cyanide	SFAPI	0.5	mg/kg^	UM	<0.6	<0.7	
Soil Organic Matter	WSLM59	0.04	% m/m^	U	5.46	7.61	
Arsenic as As	ICPMSS	0.3	mg/kg^	UM	11.2	4.5	
Cadmium as Cd	ICPMSS	0.2	mg/kg^	UM	<0.2	<0.2	
Copper as Cu	ICPMSS	1.6	mg/kg^	UM	26.8	11.0	
Lead as Pb	ICPMSS	0.7	mg/kg^	UM	54.4	27.7	
Mercury as Hg	ICPMSS	0.5	mg/kg^	UM	<0.5	<0.5	
Nickel as Ni	ICPMSS	2	mg/kg^	UM	19.6	15.5	
Selenium as Se	ICPMSS	0.5	mg/kg^	UM	<0.5	<0.5	
Total Chromium as Cr	ICPMSS	1.2	mg/kg^	UM	14.2	6.4	
Vanadium as V	ICPMSS	0.6	mg/kg^	N	20.8	9.4	
Zinc as Zn	ICPMSS	16	mg/kg^	UM	90.9	39.2	







Project Name: F2033-22-F2033-22

Project No: 22101067

Date Issued: 28/10/2022

			s	ample ID	001	002
			Cus	tomer ID	WS01-W-1-ES-0.30	WS01-W-2-ES-0.80
			Sam	ple Type	SOLID	SOLID
			Samp	ling Date	12/10/2022	12/10/2022
Analysis	Method Code	MDL	Units	Accred.		
Boron as B	ICPBOR	0.5	mg/kg^	UM	1.4	5.4
Water Soluble Sulphate as SO4 by Mass	ICPWSS	20	mg/kg^	UM	53	52
Acid Soluble Sulphate as SO4	ICPACIDS	20	mg/kg^	UM	758	1450
Acenaphthene	PAHMSUS	0.08	mg/kg^	UM	<0.09	<0.11
Acenaphthylene	PAHMSUS	0.08	mg/kg^	U	<0.09	<0.11
Anthracene	PAHMSUS	0.08	mg/kg^	U	0.34	<0.11
Benzo[a]anthracene	PAHMSUS	0.08	mg/kg^	UM	1.21	0.40
Benzo[a]pyrene	PAHMSUS	0.08	mg/kg^	UM	1.41	0.50
Benzo[b]fluoranthene	PAHMSUS	0.08	mg/kg^	UM	1.54	0.53
Benzo[g,h,i]perylene	PAHMSUS	0.08	mg/kg^	UM	0.87	0.38
Benzo[k]fluoranthene	PAHMSUS	0.08	mg/kg^	UM	0.86	0.34
Chrysene	PAHMSUS	0.08	mg/kg^	UM	1.57	0.59
Coronene	PAHMSUS	0.08	mg/kg^	N	0.14	<0.11
Dibenzo[a,h]anthracene	PAHMSUS	0.08	mg/kg^	UM	0.18	<0.11
Fluoranthene	PAHMSUS	0.08	mg/kg^	UM	3.27	0.93
Fluorene	PAHMSUS	0.08	mg/kg^	UM	<0.09	<0.11
Indeno[1,2,3-cd]pyrene	PAHMSUS	0.08	mg/kg^	UM	0.83	0.36
Naphthalene	PAHMSUS	0.08	mg/kg^	UM	<0.09	<0.11
Phenanthrene	PAHMSUS	0.08	mg/kg^	UM	1.25	0.35







Project Name: F2033-22-F2033-22

Project No: 22101067

Date Issued: 28/10/2022

			s	ample ID	001	002
			Cus	tomer ID	WS01-W-1-ES-0.30	WS01-W-2-ES-0.80
			Sam	ple Type	SOLID	SOLID
			Samp	ling Date	12/10/2022	12/10/2022
Analysis	Method Code	MDL	Units	Accred.		
Pyrene	PAHMSUS	0.08	mg/kg^	UM	2.80	0.82
Total PAH 16	PAHMSUS	1.28	mg/kg^	U	16.5	5.88
Total Moisture at 35°C	CLANDPREP	0.1	%	N	14.6	28.0
Description of Solid Material	CLANDPREP		-	N	SILT	SILT
Redox Potential	SUB016		mV	N	305.45	329.30
Asbestos Identification	SUB020		-	N	NAIIS	NAIIS







CERTIFICATE OF ANALYSIS

ANALYSIS REQUESTED BY: SOCOTEC UK Ltd

Environmental Chemistry

PO Box 100 Burton upon Trent

Staffordshire DE15 0XD **CONTRACT NO:** \$28552-3

DATE OF ISSUE: 26.10.22

DATE SAMPLES RECEIVED: 19.10.22

DATE ANALYSIS COMPLETED: 25.10.22

DESCRIPTION: Two soil/loose aggregate samples each weighing approximately 1.1-1.2kg.

ANALYSIS REQUESTED: Qualitative and quantitative analysis of soil/loose aggregate samples for

mass determination of asbestos.

METHODS:

Qualitative - The samples were analysed qualitatively for asbestos by polarised light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative - The analysis was carried out using our documented in-house method based on HSE Contract Research Report No. 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies *et al*, 1996) and HSG 248. Our method includes initial examination of the entire sample, detailed analysis of a representative sub-sample and quantification by hand picking/weighing and/or fibre counting/sizing as appropriate.

RESULTS:

Initial Screening

No asbestos was detected in either of the soil samples by stereo-binocular and polarised light microscopy.

A summary of the results is given in Table 1.







CONTRACT NO: \$28552-3 **DATE OF ISSUE:** 26.10.22

RESULTS: (cont.)

Table 1: Qualitative Results

SOCOTEC Job I.D: 22101067

IOM sample number	SOCOTEC Sample ID	Client Sample ID	ACM type detected	PLM result
S28552-4	22101067-001	WS01-W-1-ES-0.30	-	No Asbestos Detected
S28552-5	22101067-002	WS01-W-2-ES-0.80	-	No Asbestos Detected

Our detection limit for this method is 0.001%.

COMMENTS:

IOM Consulting cannot accept responsibility for samples that have been incorrectly collected or despatched by external clients.

Any opinions and interpretations expressed herein are out with the scope of our UKAS accreditation.





Element Materials Technology

Unit 3 Deeside Point

Zone 3

Deeside Industrial Park

Deeside CH5 2UA P: +44 (0) 1244 833780

F: +44 (0) 1244 833781

W: www.element.com

Socotec ESG ESG House, Bretby Business Park Bretby

Attention:

Burton upon Trent

Date: 26th October, 2022

Your reference: 22101067

Our reference : Test Report 22/17212 Batch 1

Location: F2033-22

Date samples received: 20th October, 2022

Status: Final Report

Issue: 1

Two samples were received for analysis on 20th October, 2022 of which two were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:



Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Socotec

Reference: 22101067 **Location:** F2033-22

Contact:

EMT Job No: 22/17212

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

LINIT SOD NO.	22/11212										
EMT Sample No.	1	2									
Sample ID	22101067-001	22101067-002									
Depth									Please se	e attached n	otes for all
COC No / misc									abbrevi	ations and ac	cronyms
Containers	J	J									
Sample Date	12/10/2022	12/10/2022									
Sample Type	Soil	Soil									
Batch Number	1	1							LOD/LOR	Units	Method
Date of Receipt											No.
Redox Potential	305.45	329.30								mV	TM139/PM0
	_		_			_	•	_		•	_

Client Name: Socotec Reference: 22101067 Location: F2033-22

Contact:

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
					No deviating sample report results for job 22/17212	

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 22/17212

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCI (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

EMT Job No.: 22/17212

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
В	Indicates analyte found in associated method blank.
DR	Dilution required.
М	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
со	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
ТВ	Trip Blank Sample
ОС	Outside Calibration Range

Element Materials Technology

Method Code Appendix

EMT Job No: 22/17212

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM139	ASTM G200-09 (2014) Oxidation-Reduction potential of soil samples removed from the ground, using Redox probe and meter.	PM0	No preparation is required.			AR	No



Client: SOCOTEC Geotechnical Project Name: F2033-22-F2033-22

Project No: 22101067 Date Issued: 28/10/2022

Deviating Sample Report

All samples received in an appropriate condition with no deviancies noted with the samples.

Analysis Method

Method Code	Method Description	Analysis Method
CLANDPREP	Basic Solid Description	As Received
CLANDPREP	DW35 - CLand Prep and Dry Weight Correction to 35°C	As Received
ICPACIDS	Sulphate as SO4 (Acid Soluble)	Air Dried & Ground
ICPBOR	Boron (Water Soluble) by ICPOES	Air Dried & Ground
ICPMSS	Arsenic in Solids by ICPMS	Air Dried & Ground
ICPMSS	Cadmium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Chromium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Copper in Solids by ICPMS	Air Dried & Ground
ICPMSS	Lead in Solids by ICPMS	Air Dried & Ground
ICPMSS	Mercury in Solids by ICPMS	Air Dried & Ground
ICPMSS	Nickel in Solids by ICPMS	Air Dried & Ground
ICPMSS	Selenium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Vanadium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Zinc in Solids by ICPMS	Air Dried & Ground
ICPWSS	Sulphate as SO4 (Water Soluble)	Air Dried & Ground
KONECL	Chloride (2:1) by Colorimetry	Air Dried & Ground
KONENS	Chromium VI (Hexavalent) by Colorimetry	Air Dried & Ground
PAHMSUS	17 PAHs (inc. Coronene) by GCMS	As Received
PHSOIL	pH (2.5:1)	As Received
SFAPI	Cyanide (Complex) by SFA	As Received
SFAPI	Cyanide (Free) by SFA	As Received
SFAPI	Cyanide (Total) by SFA	As Received
SFAPI	Sulphide by SFA	As Received
SUB016	Redox Potential in Soil	
SUB020	Asbestos Stage 1 (with Stage 2+3 Trigger)	
TSCONW	Electrical Conductivity (5:1)	Air Dried & Ground
WSLM59	SOM: Soil Organic Matter (%) (Calc)	Air Dried & Ground



Client: SOCOTEC Geotechnical Project Name: F2033-22-F2033-22

Project No: 22101067 Date Issued: 28/10/2022

Result Report Notes

Letters alongside results signify that the result has associated report notes. The report notes are as follows:

Le	tte	r	N	ot	е

- A Due to the matrix of the sample the laboratory has had to deviate from our standard protocols to be able to process the sample and provide a result. Where applicable the accreditation has been removed and this should be taken into consideration when utilising the data.
- B The QC associated with this result has not wholly met the QMS requirements, the accreditation has therefore been removed. However, the Laboratory has confidence in the performance of the method as a whole and that the integrity of the data has not been significantly compromised.
- Due to matrix interference, the internal standard and/or surrogate has not met the QMS requirements. This should be taken into consideration when utilising the data.
- D A non-standard volume or mass has been used for this test which has resulted in a raised detection limit.
- E Due to the parameter value being beyond our calibration range (and following the maximum size of dilution allowed, where applicable), the result cannot be quantified and as such the result will appear as a greater than symbol (>) with the accreditation removed. This data should be used for indicative purposes only.
- F Based on the sample history, appearance and smell a dilution was applied prior to testing. Unfortunately, the result is either above (>) or below (<) our calibration range. Results above our calibration range have accreditation removed. The data should be used for indicative purposes only.
- G The day 5 oxygen reading was below the capability of the instrument to detect, and therefore the calculated BOD has been reported unaccredited for guidance purposes only.

HWOL Acronym Key

<u>Acronym</u> <u>Description</u>

HS Headspace Analysis

EH Extractable Hydrocarbons - i.e everything extracted by the solvent(s)

CU Clean up - e.g. by florisil, silica gel
1D GC - Single coil gas chromatography

Total Aliphatics & Aromatics

AL Aliphatics only AR Aromatics only

+ Operator to indicate cumulative e.g. EH_CU+HS_1D_Total



Client: SOCOTEC Geotechnical Project Name: F2033-22-F2033-22

Project No: 22101067 Date Issued: 28/10/2022

Additional Information

This report refers to samples as received. SOCOTEC UK Ltd takes no responsibility for accuracy or competence of sampling by others.

Results within this report relate only to the samples tested.

The accreditation codes are as follows:

U = UKAS accredited analysis M = MCERT accredited analysis N = Unaccredited analysis

Any units marked with ^ signify results are reported on a dry weight basis of 35 ° c.

All Air Dried and Ground Samples (ADG) are oven dried at less than 35° c.

This report shall not be reproduced except in full, without written approval of the laboratory.

Opinions and interpretations given are outside the scope of our UKAS accreditation.

Any samples marked with * are not covered by our scope of UKAS accreditation. If applicable, further report notes have been added.

Any solid samples where the Major Constituents are not one of the following (Sand, Silt, Clay, Made Ground) are not one of our accredited matrix types.

Any samples marked with ‡ have had MCERTS accreditation removed for this result

Any samples marked with a tick in the deviant table is deviant for the specific reason.

Any samples reported as IS, NA, ND mean the following:

IS = Insufficient Sample to complete analysis

NA = Sample is not amenable for the required analysis

ND = Results cannot be determined

Items listed with a 'SUB' method code prefix have been carried out by an external subcontracted laboratory.

Our deviating sample report does not include deviancy information for Subcontracted analysis. Please see the report from the subcontracted lab for information regarding any deviancies for this analysis.

Summaries of analysis methods are available upon request.

End of Certificate of Analysis



Environmental Chemistry

Certificate of Analysis

Client: SOCOTEC Geotechnical

Project: 22102054

Quote: BEC221027085 V1.1

Project Ref: F2033-22

Site: F2033-22 Crowle Flood Alleviation

Contact:

Address: Geotechnical House

18-19 Drome Road

Deeside Flintshire CH5 2NY

E-Mail:

Phone:

No. Samples Received: 1

Date Received: 26/10/2022

Analysis Date: 08/11/2022

Date Issued: 08/11/2022

Report Type: Final Version 01

This report supersedes any versions previously issued by the laboratory



SOCOTEC Environmental Chemistry, Bretby Business Park, Ashby Road, Burton-Upon-Trent, DE15 0YZ



Project Name: F2033-22-F2033-22 Crowle Flood Alleviation

Project No: 22102054 Date Issued: 08/11/2022

Samples Analysed

Text ID	Sample Reference	Sampling Date	Sample Type	Sample Description
22102054-001	BH01-W-2-ES-0.20	18/10/2022 09:00:00	SOLID	Soil Sample



Project Name: F2033-22-F2033-22 Crowle Flood Alleviation

Project No: 22102054 Date Issued: 08/11/2022

			Sa	ample ID	001
			Cust	tomer ID	BH01-W-2-ES-0.20
			Sam	ple Type	SOLID
			Sampl	ing Date	18/10/2022
Analysis	Method Code	MDL	Units	Accred.	
>C6-C7 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.221
>C7-C8 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.221
>C7-C8 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.01	mg/kg^	UM	<0.011
>C8-C10 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.221
>C8-C10 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.04	mg/kg^	UM	<0.044
C5-C6 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.221* в
C5-C7 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.01	mg/kg^	UM	<0.011
Total GRO C5-C10 HS_1D_Total	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.221
pH (2.5:1 extraction)	PHSOIL	1	pH units	UM	7.0
Conductivity in 5:1 Water Extract	TSCONW	10	μS/cm	N	146
Chloride as Cl	KONECL	2	mg/kg^	N	26
Chromium (VI) as Cr	KONENS	0.1	mg/kg^	N	<0.1
Complex Cyanide	SFAPI	0.5	mg/kg^	UM	<0.6
Free Cyanide	SFAPI	0.5	mg/kg^	UM	<0.6
Phenol Index	SFAPI	0.5	mg/kg^	U	<0.6
Sulphide as S	SFAPI	0.5	mg/kg^	N	<0.6
Total Cyanide	SFAPI	0.5	mg/kg^	UM	<0.6
Soil Organic Matter	WSLM59	0.04	% m/m^	U	1.72
Arsenic as As	ICPMSS	0.3	mg/kg^	UM	7.1







Project Name: F2033-22-F2033-22 Crowle Flood Alleviation

Project No: 22102054

Date Issued: 08/11/2022

			S	ample ID	001				
	Customer II								
	ple Type	SOLID							
				ing Date	18/10/2022				
Analysis	Method Code	MDL	Units	Accred.					
Cadmium as Cd	ICPMSS	0.2	mg/kg^	UM	<0.2				
Copper as Cu	ICPMSS	1.6	mg/kg^	UM	15.9				
Lead as Pb	ICPMSS	0.7	mg/kg^	UM	24.6				
Mercury as Hg	ICPMSS	0.5	mg/kg^	UM	<0.5				
Nickel as Ni	ICPMSS	2	mg/kg^	UM	10.0				
Selenium as Se	ICPMSS	0.5	mg/kg^	UM	<0.5				
Total Chromium as Cr	ICPMSS	1.2	mg/kg^	UM	10.8				
Vanadium as V	ICPMSS	0.6	mg/kg^	N	12.3				
Zinc as Zn	ICPMSS	16	mg/kg^	UM	50.2				
Boron as B	ICPBOR	0.5	mg/kg^	UM	2.4				
Water Soluble Sulphate as SO4 by Mass	ICPWSS	20	mg/kg^	UM	183				
Acid Soluble Sulphate as SO4	ICPACIDS	20	mg/kg^	UM	427				
Benzene HS_1D_AR	BTEXHSA	10	μg/kg^	UM	<11				
Ethylbenzene HS_1D_AR	BTEXHSA	10	μg/kg^	UM	<11				
m/p-Xylene HS_1D_AR	BTEXHSA	20	μg/kg^	UM	<22				
o-Xylene HS_1D_AR	BTEXHSA	10	μg/kg^	UM	<11				
Toluene HS_1D_AR	BTEXHSA	10	μg/kg^	UM	<11				
Acenaphthene	PAHMSUS	0.08	mg/kg^	UM	<0.09				
Acenaphthylene	PAHMSUS	0.08	mg/kg^	U	<0.09				







Project Name: F2033-22-F2033-22 Crowle Flood Alleviation

Project No: 22102054

Date Issued: 08/11/2022

	001				
	tomer ID	BH01-W-2-ES-0.20			
			Sam	ple Type	SOLID
			Samp	ling Date	18/10/2022
Analysis	Method Code	MDL	Units	Accred.	
Anthracene	PAHMSUS	0.08	mg/kg^	U	<0.09
Benzo[a]anthracene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Benzo[a]pyrene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Benzo[b]fluoranthene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Benzo[g,h,i]perylene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Benzo[k]fluoranthene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Chrysene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Coronene	PAHMSUS	0.08	mg/kg^	N	<0.09
Dibenzo[a,h]anthracene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Fluoranthene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Fluorene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Indeno[1,2,3-cd]pyrene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Naphthalene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Phenanthrene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Pyrene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Total PAH 16	PAHMSUS	1.28	mg/kg^	U	<1.42
1,2,4-Trichlorobenzene	SVOCSW	0.1	mg/kg^	N	<0.1
1,2-Dichlorobenzene	SVOCSW	0.1	mg/kg^	U	<0.1
1,3-Dichlorobenzene	SVOCSW	0.1	mg/kg^	U	<0.1







Project Name: F2033-22-F2033-22 Crowle Flood Alleviation

Project No: 22102054 Date Issued: 08/11/2022

			s	ample ID	001
			Cus	tomer ID	BH01-W-2-ES-0.20
			Sam	ple Type	SOLID
			Samp	ling Date	18/10/2022
Analysis	Method Code	MDL	Units	Accred.	
1,4-Dichlorobenzene	SVOCSW	0.1	mg/kg^	U	<0.1
1-Methylnaphthalene	SVOCSW	0.1	mg/kg^	U	<0.1
2,4,5-Trichlorophenol	SVOCSW	0.1	mg/kg^	U	<0.1
2,4,6-Trichlorophenol	SVOCSW	0.1	mg/kg^	U	<0.1
2,4-Dichlorophenol	SVOCSW	0.1	mg/kg^	U	<0.1
2,4-Dimethylphenol	SVOCSW	0.1	mg/kg^	U	<0.1
2,4-Dinitrophenol	SVOCSW	0.5	mg/kg^	N	<0.6
2,4-Dinitrotoluene	SVOCSW	0.2	mg/kg^	U	<0.2
2,6-Dinitrotoluene	SVOCSW	0.5	mg/kg^	U	<0.6
2-Chloronaphthalene	SVOCSW	0.1	mg/kg^	U	<0.1
2-Chlorophenol	SVOCSW	0.1	mg/kg^	U	<0.1
2-Methylnaphthalene	SVOCSW	0.1	mg/kg^	U	<0.1
2-Methylphenol	SVOCSW	0.1	mg/kg^	U	<0.1
2-Nitroaniline	SVOCSW	0.5	mg/kg^	N	<0.6
2-Nitrophenol	SVOCSW	0.1	mg/kg^	U	<0.1
3- & 4-Methylphenol	SVOCSW	0.1	mg/kg^	U	0.3
3-Nitroaniline	SVOCSW	0.5	mg/kg^	N	<0.6
4,6-Dinitro-2-methylphenol	SVOCSW	0.2	mg/kg^	N	<0.2
4-Bromophenyl-phenylether	SVOCSW	0.1	mg/kg^	U	<0.1







Project Name: F2033-22-F2033-22 Crowle Flood Alleviation

Project No: 22102054

Date Issued: 08/11/2022

Analysis Results					
			s	ample ID	001
			Cus	tomer ID	BH01-W-2-ES-0.20
			0		00110
				ple Type	SOLID
			-	ling Date	18/10/2022
Analysis	Method Code	MDL	Units	Accred.	
4-Chloro-3-methylphenol	SVOCSW	0.1	mg/kg^	U	<0.1
4-Chloroaniline	SVOCSW	0.5	mg/kg^	N	<0.6
4-Chlorophenol	SVOCSW	0.5	mg/kg^	U	<0.6
4-Chlorophenyl-phenylether	SVOCSW	0.1	mg/kg^	U	<0.1
4-Nitroaniline	SVOCSW	0.6	mg/kg^	N	<0.7
4-Nitrophenol	SVOCSW	0.5	mg/kg^	N	<0.6
Acenaphthene	SVOCSW	0.1	mg/kg^	U	<0.1
Acenaphthylene	SVOCSW	0.1	mg/kg^	U	<0.1
Anthracene	SVOCSW	0.1	mg/kg^	U	<0.1
Azobenzene	SVOCSW	0.3	mg/kg^	N	<0.3
Benzo[a]anthracene	SVOCSW	0.2	mg/kg^	U	<0.2
Benzo[a]pyrene	SVOCSW	0.2	mg/kg^	U	<0.2
Benzo[b]fluoranthene	SVOCSW	0.2	mg/kg^	U	<0.2
Benzo[g,h,i]perylene	SVOCSW	0.5	mg/kg^	U	<0.6
Benzo[k]fluoranthene	SVOCSW	0.2	mg/kg^	U	<0.2
Benzoic Acid	SVOCSW	0.5	mg/kg^	N	<0.6
Benzyl alcohol	SVOCSW	0.5	mg/kg^	U	<0.6
Biphenyl	SVOCSW	0.1	mg/kg^	U	<0.1
bis(2-Chloroethoxy)methane	SVOCSW	0.1	mg/kg^	U	<0.1







Project Name: F2033-22-F2033-22 Crowle Flood Alleviation

Project No: 22102054

Date Issued: 08/11/2022

		ample ID	001		
			Cus	tomer ID	BH01-W-2-ES-0.20
			Sam	ple Type	SOLID
			Sampl	ing Date	18/10/2022
Analysis	Method Code	MDL	Units	Accred.	
bis(2-Chloroethyl)ether	SVOCSW	0.1	mg/kg^	U	<0.1
bis(2-Chloroisopropyl)ether	SVOCSW	0.5	mg/kg^	U	<0.6
bis(2-Ethylhexyl)phthalate	SVOCSW	0.2	mg/kg^	U	<0.2
Butylbenzylphthalate	SVOCSW	0.2	mg/kg^	U	<0.2
Carbazole	SVOCSW	0.3	mg/kg^	N	<0.3
Chrysene	SVOCSW	0.2	mg/kg^	U	<0.2
Coronene	SVOCSW	0.3	mg/kg^	N	<0.3
Dibenzo[a,h]anthracene	SVOCSW	0.5	mg/kg^	U	<0.6
Dibenzofuran	SVOCSW	0.1	mg/kg^	U	<0.1
Diethylphthalate	SVOCSW	0.1	mg/kg^	U	<0.1
Dimethylphthalate	SVOCSW	0.1	mg/kg^	U	<0.1
Di-n-butylphthalate	SVOCSW	0.1	mg/kg^	U	<0.1
Di-n-octylphthalate	SVOCSW	0.2	mg/kg^	U	<0.2
Diphenyl ether	SVOCSW	0.1	mg/kg^	U	<0.1
Fluoranthene	SVOCSW	0.2	mg/kg^	U	<0.2
Fluorene	SVOCSW	0.2	mg/kg^	U	<0.2
Hexachlorobenzene	SVOCSW	0.1	mg/kg^	U	<0.1
Hexachlorobutadiene	SVOCSW	0.1	mg/kg^	N	<0.1
Hexachlorocyclopentadiene	SVOCSW	0.1	mg/kg^	N	<0.1







Project Name: F2033-22-F2033-22 Crowle Flood Alleviation

Project No: 22102054

Date Issued: 08/11/2022

	ample ID	001				
	stomer ID	BH01-W-2-ES-0.20				
			Sam	nple Type	SOLID	
			Samp	ling Date	18/10/2022	
Analysis	Method Code	MDL	Units	Accred.		
Hexachloroethane	SVOCSW	0.1	mg/kg^	U	<0.1	
Indeno[1,2,3-cd]pyrene	SVOCSW	0.5	mg/kg^	U	<0.6	
Isophorone	svocsw	0.1	mg/kg^	N	<0.1	
Naphthalene	SVOCSW	0.1	mg/kg^	U	<0.1	
Nitrobenzene	SVOCSW	0.5	mg/kg^	U	<0.6	
N-Nitroso-di-n-propylamine	SVOCSW	0.9	mg/kg^ N		<1.0	
N-Nitrosodiphenylamine	SVOCSW	0.1	0.1 mg/kg^		<0.1	
Pentachlorophenol	SVOCSW	0.5	mg/kg^	N	<0.6	
Phenanthrene	SVOCSW	0.1	mg/kg^	U	<0.1	
Phenol	SVOCSW	0.1	mg/kg^	U	<0.1	
Pyrene	SVOCSW	0.2	mg/kg^	U	<0.2	
>C10-C12 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U	<4.42	
>C12-C16 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U	<4.42	
>C16-C21 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U	<4.42	
>C21-C35 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	10	mg/kg^	U	<11.1	
Total TPH >C8-C40 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	20	mg/kg^	U	<22.1	
>C10-C12 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U	<4.42	
>C12-C16 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U	<4.42	
>C16-C21 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U	5.48* в	







Project Name: F2033-22-F2033-22 Crowle Flood Alleviation

Sample ID

Project No: 22102054 Date Issued: 08/11/2022



				balliple ID	001
			Cus	stomer ID	BH01-W-2-ES-0.20
			San	nple Type	SOLID
			Samp	ling Date	18/10/2022
Analysis	Method Code	MDL	Units	Accred.	
>C21-C35 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	10	mg/kg^	U	20.5* в
Total TPH >C8-C40 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	20	mg/kg^	U	33.7
Benzene	VOCHSAS	1	μg/kg^	UM	<1
Ethylbenzene	VOCHSAS	2	μg/kg^	UM	<2
m and p-Xylene	VOCHSAS	4	μg/kg^	UM	<5
МТВЕ	VOCHSAS	1	μg/kg^	UM	<1
o-Xylene	VOCHSAS	2	μg/kg^	UM	<2
Toluene	VOCHSAS	5	μg/kg^	UM	<6
1,1,1,2-Tetrachloroethane	VOCHSAS	1	μg/kg^	UM	<1
1,1,1-Trichloroethane	VOCHSAS	1	μg/kg^	UM	<1
1,1,2,2-Tetrachloroethane	VOCHSAS	1	μg/kg^	N	<1
1,1,2-Trichloroethane	VOCHSAS	1	μg/kg^	UM	<1
1,1-Dichloroethane	VOCHSAS	1	μg/kg^	UM	<1
1,1-Dichloroethene	VOCHSAS	1	μg/kg^	U	<1
1,1-Dichloropropene	VOCHSAS	1	μg/kg^	UM	<1
1,2,3-Trichlorobenzene	VOCHSAS	3	μg/kg^	UM	<3
1,2,3-Trichloropropane	VOCHSAS	1	μg/kg^	UM	<1
1,2,4-Trichlorobenzene	VOCHSAS	3	μg/kg^	N	<3
1,2,4-Trimethylbenzene	VOCHSAS	1	μg/kg^	UM	<1



Project Name: F2033-22-F2033-22 Crowle Flood Alleviation

Project No: 22102054 Date Issued: 08/11/2022

			S	ample ID	001
			Cus	stomer ID	BH01-W-2-ES-0.20
			San	nple Type	SOLID
			Samp	ling Date	18/10/2022
Analysis	Method Code	MDL	Units	Accred.	
1,2-Dibromo-3-chloropropane	VOCHSAS	1	μg/kg^	U	<1
1,2-Dibromoethane	VOCHSAS	1	μg/kg^	UM	<1
1,2-Dichlorobenzene	VOCHSAS	1	μg/kg^	UM	<1
1,2-Dichloroethane	VOCHSAS	1	μg/kg^	UM	<1
1,2-Dichloropropane	VOCHSAS	1	μg/kg^	UM	<1
1,3,5-Trimethylbenzene	VOCHSAS	1	μg/kg^	UM	<1
1,3-Dichlorobenzene	VOCHSAS	1	μg/kg^	UM	<1
1,3-Dichloropropane	VOCHSAS	1	μg/kg^	UM	<1
1,4-Dichlorobenzene	VOCHSAS	1	μg/kg^	UM	<1
2,2-Dichloropropane	VOCHSAS	2	μg/kg^	UM	<2* B
2-Chlorotoluene	VOCHSAS	1	μg/kg^	UM	<1
4-Chlorotoluene	VOCHSAS	1	μg/kg^	UM	<1
Benzene	VOCHSAS	1	μg/kg^	UM	<1
Bromobenzene	VOCHSAS	1	μg/kg^	UM	<1
Bromochloromethane	VOCHSAS	1	μg/kg^	UM	<1
Bromodichloromethane	VOCHSAS	1	μg/kg^	UM	<1
Bromoform	VOCHSAS	1	μg/kg^	UM	<1
Bromomethane	VOCHSAS	1	μg/kg^	UM	<1
Carbon Tetrachloride	VOCHSAS	1	μg/kg^	UM	<1







Project Name: F2033-22-F2033-22 Crowle Flood Alleviation

Project No: 22102054

Date Issued: 08/11/2022

	Sample II						
			Cus	tomer ID	BH01-W-2-ES-0.20		
			Sam	ple Type	SOLID		
			Samp	ling Date	18/10/2022		
Analysis	Method Code	MDL	Units	Accred.			
Chlorobenzene	VOCHSAS	1	μg/kg^	UM	<1		
Chloroethane	VOCHSAS	2	μg/kg^	UM	<2		
Chloroform	VOCHSAS	1	µg/kg^	UM	3		
Chloromethane	VOCHSAS	3	μg/kg^	U	<3		
cis 1,2-Dichloroethene	VOCHSAS	5	µg/kg^	UM	<6		
cis 1,3-Dichloropropene	VOCHSAS	1	μg/kg^	UM	<1		
Dibromochloromethane	VOCHSAS	1	μg/kg^	UM	<1		
Dibromomethane	VOCHSAS	1	μg/kg^	UM	<1		
Dichlorodifluoromethane	VOCHSAS	1	μg/kg^	N	<1		
Ethylbenzene	VOCHSAS	2	μg/kg^	UM	<2		
Hexachlorobutadiene	VOCHSAS	2	μg/kg^	N	<2		
iso-Propylbenzene	VOCHSAS	1	μg/kg^	UM	<1		
m and p-Xylene	VOCHSAS	4	µg/kg^	UM	<5		
MTBE	VOCHSAS	1	µg/kg^	UM	<1		
Naphthalene	VOCHSAS	5	µg/kg^	UM	<6		
n-Butylbenzene	VOCHSAS	1	μg/kg^	U	<1		
o-Xylene	VOCHSAS	2	μg/kg^	UM	<2		
p-Isopropyltoluene	VOCHSAS	1	µg/kg^	UM	<1		
Propylbenzene	VOCHSAS	1	μg/kg^	UM	<1		







Project Name: F2033-22-F2033-22 Crowle Flood Alleviation

Project No: 22102054 Date Issued: 08/11/2022

			ample ID	001	
			Cus	stomer ID	BH01-W-2-ES-0.20
			San	ple Type	SOLID
			Samp	ling Date	18/10/2022
Analysis	Method Code	MDL	Units	Accred.	
sec-Butylbenzene	VOCHSAS	1	μg/kg^	UM	<1
Styrene	VOCHSAS	1	μg/kg^	UM	<1
tert-Butylbenzene	VOCHSAS	1	μg/kg^	UM	<1
Tetrachloroethene	VOCHSAS	3	μg/kg^	UM	<3
Toluene	VOCHSAS	5	μg/kg^	UM	<6
trans 1,2-Dichloroethene	VOCHSAS	1	μg/kg^	UM	<1
trans 1,3-Dichloropropene	VOCHSAS	1	μg/kg^	UM	<1
Trichloroethene	VOCHSAS	1	μg/kg^	U	<1
Trichlorofluoromethane	VOCHSAS	1	μg/kg^	UM	<1
Vinyl Chloride	VOCHSAS	1	μg/kg^	UM	<1
Total Moisture at 35°C	CLANDPREP	0.1	%	N	9.6
Description of Solid Material	CLANDPREP		-	N	SILT
Redox Potential	SUB016		mV	N	309.89
Asbestos Identification	SUB020		-	N	NAIIS







Element Materials Technology

Unit 3 Deeside Point

Zone 3

Deeside Industrial Park

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Socotec ESG ESG House, Bretby Business Park Bretby Burton upon Trent

Attention:

Date: 7th November, 2022

Your reference: 22102054

Our reference : Test Report 22/17726 Batch 1

Location: F2033-22 Crowle Flood Alleviation

Date samples received: 27th October, 2022

Status: Final Report

Issue:

One sample was received for analysis on 27th October, 2022 and was scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:



Please include all sections of this report if it is reproduced

Element Materials Technology

Socotec Client Name: 22102054

Reference:

Location:

F2033-22 Crowle Flood Alleviation

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Report : Solid

Contact:

EMT Job No:	22/17726					 	 		_		
EMT Sample No.	1										
Sample ID	22102054-001										
Depth									Please se	e attached n	otes for all
COC No / misc									abbrevi	ations and ad	cronyms
Containers	V								İ		
Sample Date	18/10/2022										
Sample Type	Soil								ĺ		
Batch Number	1										Method
Date of Receipt	27/10/2022								LOD/LOR	Units	No.
Redox Potential	309.89									mV	TM139/PM0
	<u> </u>	<u>I</u>	<u> </u>	Į.	I		l	<u> </u>	I		<u> </u>

Client Name: Socotec Reference: 22102054

Location: F2033-22 Crowle Flood Alleviation

Contact:

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason				
	No deviating sample report results for job 22/17726									

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 22/17726

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCI (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

EMT Job No.: 22/17726

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
В	Indicates analyte found in associated method blank.
DR	Dilution required.
М	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
со	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
ТВ	Trip Blank Sample
ОС	Outside Calibration Range

Element Materials Technology

Method Code Appendix

EMT Job No: 22/17726

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
ТМ139	ASTM G200-09 (2014) Oxidation-Reduction potential of soil samples removed from the ground, using Redox probe and meter.	PM0	No preparation is required.			AR	No



CERTIFICATE OF ANALYSIS

ANALYSIS REQUESTED BY: SOCOTEC UK Ltd

Environmental Chemistry

PO Box 100 Burton upon Trent Staffordshire DE15 0XD **CONTRACT NO:** \$28774-9

DATE OF ISSUE: 03.11.22

DATE SAMPLE RECEIVED: 27.10.22

DATE ANALYSIS COMPLETED: 02.11.22

DESCRIPTION: One soil/loose aggregate sample weighing approximately 0.9kg.

ANALYSIS REQUESTED: Qualitative and quantitative analysis of a soil/loose aggregate sample for

mass determination of asbestos.

METHODS:

Qualitative - The sample was analysed qualitatively for asbestos by polarised light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative - The analysis was carried out using our documented in-house method based on HSE Contract Research Report No. 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies *et al*, 1996) and HSG 248. Our method includes initial examination of the entire sample, detailed analysis of a representative sub-sample and quantification by hand picking/weighing and/or fibre counting/sizing as appropriate.

RESULTS:

Initial Screening

No asbestos was detected in the soil sample by stereo-binocular and polarised light microscopy.

A summary of the results is given in Table 1.







CONTRACT NO: \$28774-9 **DATE OF ISSUE:** 03.11.22

RESULTS: (cont.)

Table 1: Qualitative Results

SOCOTEC Job I.D: 22102054

IOM sample number	SOCOTEC Sample ID	Client Sample ID	ACM type detected	PLM result
S28774-21	22102054-001	BH01-W-2-ES-0.20	-	No Asbestos Detected

Our detection limit for this method is 0.001%.

COMMENTS:

IOM Consulting cannot accept responsibility for samples that have been incorrectly collected or despatched by external clients.

Any opinions and interpretations expressed herein are out with the scope of our UKAS accreditation.





Project Name: F2033-22-F2033-22 Crowle Flood Alleviation

Project No: 22102054 Date Issued: 08/11/2022

Deviating Sample Report

Sample Reference	<u>Text ID</u>	Method Code	Incorrect Container	Incorrect Label	Headspace	Incorrect/No Preservative	No Sampling Date	Holding Time
BH01-W-2-ES-0.20	22102054-001	BTEXHSA			✓			✓
BH01-W-2-ES-0.20	22102054-001	GROHSA/BTEXHSA						✓

Analysis Method

Method Code	Method Description	Analysis Method
BTEXHSA	BTEX by GCFID	As Received
CLANDPREP	Basic Solid Description	As Received
CLANDPREP	DW35 - CLand Prep and Dry Weight Correction to 35°C	As Received
GROHSA/BTEXHSA	GRO CWG (C5-C10) Ali/Aro Split	As Received
ICPACIDS	Sulphate as SO4 (Acid Soluble)	Air Dried & Ground
ICPBOR	Boron (Water Soluble) by ICPOES	Air Dried & Ground
ICPMSS	Arsenic in Solids by ICPMS	Air Dried & Ground
ICPMSS	Cadmium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Chromium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Copper in Solids by ICPMS	Air Dried & Ground
ICPMSS	Lead in Solids by ICPMS	Air Dried & Ground
ICPMSS	Mercury in Solids by ICPMS	Air Dried & Ground
ICPMSS	Nickel in Solids by ICPMS	Air Dried & Ground
ICPMSS	Selenium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Vanadium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Zinc in Solids by ICPMS	Air Dried & Ground
ICPWSS	Sulphate as SO4 (Water Soluble)	Air Dried & Ground
KONECL	Chloride (2:1) by Colorimetry	Air Dried & Ground
KONENS	Chromium VI (Hexavalent) by Colorimetry	Air Dried & Ground
PAHMSUS	17 PAHs (inc. Coronene) by GCMS	As Received
PHSOIL	pH (2.5:1)	As Received
SFAPI	Cyanide (Complex) by SFA	As Received
SFAPI	Cyanide (Free) by SFA	As Received
SFAPI	Cyanide (Total) by SFA	As Received
SFAPI	Phenol Index (Total) by SFA	As Received
SFAPI	Sulphide by SFA	As Received
SUB016	Redox Potential in Soil	

SUB020

Asbestos Stage 1 (with Stage 2+3 Trigger)

SVOCSW SVOCs (Target List) by GCMS

TPH (CWG) Aliphatic Split with Carbon Banding TPHFIDUS (Aliphatic) As Received TPH (CWG) Aromatic Split with Carbon Banding TPHFIDUS (Aromatic) As Received **TSCONW** Electrical Conductivity (5:1) Air Dried & Ground **VOCHSAS** BTEX & MTBE by GCMS As Received **VOCHSAS** VOCs (Target List) by GCMS As Received WSLM59 SOM: Soil Organic Matter (%) (Calc) Air Dried & Ground

As Received



Project Name: F2033-22-F2033-22 Crowle Flood Alleviation

Project No: 22102054 Date Issued: 08/11/2022

Result Report Notes

Letters alongside results signify that the result has associated report notes. The report notes are as follows:

Letter	Note
--------	------

- A Due to the matrix of the sample the laboratory has had to deviate from our standard protocols to be able to process the sample and provide a result. Where applicable the accreditation has been removed and this should be taken into consideration when utilising the data.
- B The QC associated with this result has not wholly met the QMS requirements, the accreditation has therefore been removed. However, the Laboratory has confidence in the performance of the method as a whole and that the integrity of the data has not been significantly compromised.
- Due to matrix interference, the internal standard and/or surrogate has not met the QMS requirements. This should be taken into consideration when utilising the data.
- D A non-standard volume or mass has been used for this test which has resulted in a raised detection limit.
- E Due to the parameter value being beyond our calibration range (and following the maximum size of dilution allowed, where applicable), the result cannot be quantified and as such the result will appear as a greater than symbol (>) with the accreditation removed. This data should be used for indicative purposes only.
- F Based on the sample history, appearance and smell a dilution was applied prior to testing. Unfortunately, the result is either above (>) or below (<) our calibration range. Results above our calibration range have accreditation removed. The data should be used for indicative purposes only.
- G The day 5 oxygen reading was below the capability of the instrument to detect, and therefore the calculated BOD has been reported unaccredited for guidance purposes only.

HWOL Acronym Key

<u>Acronym</u> <u>Description</u>

HS Headspace Analysis

EH Extractable Hydrocarbons - i.e everything extracted by the solvent(s)

CU Clean up - e.g. by florisil, silica gel
1D GC - Single coil gas chromatography

Total Aliphatics & Aromatics

AL Aliphatics only AR Aromatics only

+ Operator to indicate cumulative e.g. EH_CU+HS_1D_Total



Project Name: F2033-22-F2033-22 Crowle Flood Alleviation

Project No: 22102054 Date Issued: 08/11/2022

Additional Information

This report refers to samples as received. SOCOTEC UK Ltd takes no responsibility for accuracy or competence of sampling by others.

Results within this report relate only to the samples tested.

The accreditation codes are as follows:

U = UKAS accredited analysis M = MCERT accredited analysis N = Unaccredited analysis

Any units marked with ^ signify results are reported on a dry weight basis of 35 ° c.

All Air Dried and Ground Samples (ADG) are oven dried at less than 35° c.

This report shall not be reproduced except in full, without written approval of the laboratory.

Opinions and interpretations given are outside the scope of our UKAS accreditation.

Any samples marked with * are not covered by our scope of UKAS accreditation. If applicable, further report notes have been added.

Any solid samples where the Major Constituents are not one of the following (Sand, Silt, Clay, Made Ground) are not one of our accredited matrix types.

Any samples marked with ‡ have had MCERTS accreditation removed for this result

Any samples marked with a tick in the deviant table is deviant for the specific reason.

Any samples reported as IS, NA, ND mean the following:

IS = Insufficient Sample to complete analysis

NA = Sample is not amenable for the required analysis

ND = Results cannot be determined

Items listed with a 'SUB' method code prefix have been carried out by an external subcontracted laboratory.

Our deviating sample report does not include deviancy information for Subcontracted analysis. Please see the report from the subcontracted lab for information regarding any deviancies for this analysis.

Summaries of analysis methods are available upon request.

End of Certificate of Analysis



Environmental Chemistry

Certificate of Analysis

Client: SOCOTEC Geotechnical

Project: 22120845

Quote: BEC221027085 V1.1

Project Ref: F2033-22

Site: Crowle

Contact:

Address: Geotechnical House

18-19 Drome Road

Deeside Flintshire CH5 2NY

E-Mail:

Phone:

No. Samples Received: 2

Date Received: 09/12/2022

Analysis Date: 23/12/2022

Date Issued: 23/12/2022

Report Type: Final Version 01

This report supersedes any versions previously issued by the laboratory



SOCOTEC Environmental Chemistry, Bretby Business Park, Ashby Road, Burton-Upon-Trent, DE15 0YZ



Project Name: F2033-22-Crowle

Project No: 22120845 Date Issued: 23/12/2022

Samples Analysed

Text ID	Sample Reference	Sampling Date	Sample Type	Sample Description
22120845-001	WS04-E-6-ES-1.00-1.00	07/12/2022 13:25:00	SOLID	Soil Sample
22120845-002	WS04-E-8-ES-1.50-1.50	07/12/2022 13:35:00	SOLID	Soil Sample



Project Name: F2033-22-Crowle

Project No: 22120845

Date Issued: 23/12/2022

Sample ID					001	002
			Cus	tomer ID	WS04-E-6-ES-1.00- 1.00	WS04-E-8-ES-1.50- 1.50
			Sam	ple Type	SOLID	SOLID
			Samp	ling Date	07/12/2022	07/12/2022
Analysis	Method Code	MDL	Units	Accred.		
>C6-C7 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.260* в	<0.238* в
>C7-C8 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.260	<0.238
>C7-C8 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.01	mg/kg^	UM	<0.013	<0.012
>C8-C10 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.260* _B	<0.238* в
>C8-C10 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.04	mg/kg^	UM	<0.052* в	<0.048* в
C5-C6 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.260	<0.238
C5-C7 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.01	mg/kg^	UM	<0.013* в	<0.012* в
Total GRO C5-C10 HS_1D_Total	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.260	<0.238
pH (2.5:1 extraction)	PHSOIL	1	pH units	UM	7.8	7.6
Conductivity in 5:1 Water Extract	TSCONW	10	μS/cm	N	420	306
Chloride as Cl	KONECL	2	mg/kg^	N	397	161
Chromium (VI) as Cr	KONENS	0.1	mg/kg^	N	<0.1	<0.1
Complex Cyanide	SFAPI	0.5	mg/kg^	UM	<0.6	<0.6
Free Cyanide	SFAPI	0.5	mg/kg^	UM	<0.6	<0.6
Phenol Index	SFAPI	0.5	mg/kg^	U	<0.6	<0.6
Sulphide as S	SFAPI	0.5	mg/kg^	N	<0.6	1.2
Total Cyanide	SFAPI	0.5	mg/kg^	UM	<0.6	<0.6
Soil Organic Matter	WSLM59	0.04	% m/m^	U	3.75	2.08
Arsenic as As	ICPMSS	0.3	mg/kg^	UM	2.7	3.2







Project Name: F2033-22-Crowle

Project No: 22120845

Date Issued: 23/12/2022

	001	002				
	WS04-E-6-ES-1.00- 1.00	WS04-E-8-ES-1.50- 1.50				
			Sam	ple Type	SOLID	SOLID
			Samp	ling Date	07/12/2022	07/12/2022
Analysis	Method Code	MDL	Units	Accred.		
Cadmium as Cd	ICPMSS	0.2	mg/kg^	UM	<0.2	<0.2
Copper as Cu	ICPMSS	1.6	mg/kg^	UM	13.9	22.0
Lead as Pb	ICPMSS	0.7	mg/kg^	UM	10.1	11.1
Mercury as Hg	ICPMSS	0.5	mg/kg^	UM	<0.5	<0.5
Nickel as Ni	ICPMSS	2	mg/kg^	UM	9.6	20.2
Selenium as Se	ICPMSS	0.5	mg/kg^	UM	<0.5	<0.5
Total Chromium as Cr	ICPMSS	1.2	mg/kg^	UM	8.8	13.4
Vanadium as V	ICPMSS	0.6	mg/kg^	N	11.0	16.0
Zinc as Zn	ICPMSS	16	mg/kg^	UM	37.7	36.2
Boron as B	ICPBOR	0.5	mg/kg^	UM	3.9	2.3
Water Soluble Sulphate as SO4 by Mass	ICPWSS	20	mg/kg^	UM	179	84
Acid Soluble Sulphate as SO4	ICPACIDS	20	mg/kg^	UM	526	247
Benzene HS_1D_AR	BTEXHSA	10	μg/kg^	UM	<13* _B	<12* _B
Ethylbenzene HS_1D_AR	BTEXHSA	10	μg/kg^	UM	<13	<12
m/p-Xylene HS_1D_AR	BTEXHSA	20	μg/kg^	UM	<26	<24
o-Xylene HS_1D_AR	BTEXHSA	10	μg/kg^	UM	<13* в	<12* _B
Toluene HS_1D_AR	BTEXHSA	10	μg/kg^	UM	<13	<12
Acenaphthene	PAHMSUS	0.08	mg/kg^	UM	<0.10	<0.10
Acenaphthylene	PAHMSUS	0.08	mg/kg^	U	<0.10	<0.10







Project Name: F2033-22-Crowle

Project No: 22120845

Date Issued: 23/12/2022

Sample ID				001	002	
			Cus	tomer ID	WS04-E-6-ES-1.00- 1.00	WS04-E-8-ES-1.50- 1.50
			San	ple Type	SOLID	SOLID
			Samp	ling Date	07/12/2022	07/12/2022
Analysis	Method Code	MDL	Units	Accred.		
Anthracene	PAHMSUS	0.08	mg/kg^	U	<0.10	<0.10
Benzo[a]anthracene	PAHMSUS	0.08	mg/kg^	UM	<0.10	<0.10
Benzo[a]pyrene	PAHMSUS	0.08	mg/kg^	UM	<0.10	<0.10
Benzo[b]fluoranthene	PAHMSUS	0.08	mg/kg^	UM	<0.10	<0.10
Benzo[g,h,i]perylene	PAHMSUS	0.08	mg/kg^	UM	<0.10	<0.10
Benzo[k]fluoranthene	PAHMSUS	0.08	mg/kg^	UM	<0.10	<0.10
Chrysene	PAHMSUS	0.08	mg/kg^	UM	<0.10	<0.10
Coronene	PAHMSUS	0.08	mg/kg^	N	<0.10	<0.10
Dibenzo[a,h]anthracene	PAHMSUS	0.08	mg/kg^	UM	<0.10	<0.10
Fluoranthene	PAHMSUS	0.08	mg/kg^	UM	0.12	<0.10
Fluorene	PAHMSUS	0.08	mg/kg^	UM	<0.10	<0.10
Indeno[1,2,3-cd]pyrene	PAHMSUS	0.08	mg/kg^	UM	<0.10	<0.10
Naphthalene	PAHMSUS	0.08	mg/kg^	UM	0.28	<0.10
Phenanthrene	PAHMSUS	0.08	mg/kg^	UM	0.24	<0.10
Pyrene	PAHMSUS	0.08	mg/kg^	UM	<0.10	<0.10
Total PAH 16	PAHMSUS	1.28	mg/kg^	U	1.99	<1.52
1,2,4-Trichlorobenzene	SVOCSW	0.1	mg/kg^	N	<0.1	<0.1
1,2-Dichlorobenzene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
1,3-Dichlorobenzene	svocsw	0.1	mg/kg^	U	<0.1	<0.1







Project Name: F2033-22-Crowle

Project No: 22120845

Date Issued: 23/12/2022

		001	002			
	WS04-E-6-ES-1.00- 1.00	WS04-E-8-ES-1.50- 1.50				
			Sam	ple Type	SOLID	SOLID
			Samp	ling Date	07/12/2022	07/12/2022
Analysis	Method Code	MDL	Units	Accred.		
1,4-Dichlorobenzene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
1-Methylnaphthalene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
2,4,5-Trichlorophenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
2,4,6-Trichlorophenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
2,4-Dichlorophenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
2,4-Dimethylphenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
2,4-Dinitrophenol	SVOCSW	0.5	mg/kg^	N	<0.6	<0.6
2,4-Dinitrotoluene	SVOCSW	0.2	mg/kg^	U	<0.3	<0.2
2,6-Dinitrotoluene	SVOCSW	0.5	mg/kg^	U	<0.6	<0.6
2-Chloronaphthalene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
2-Chlorophenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
2-Methylnaphthalene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
2-Methylphenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
2-Nitroaniline	SVOCSW	0.5	mg/kg^	N	<0.6	<0.6
2-Nitrophenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
3- & 4-Methylphenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
3-Nitroaniline	SVOCSW	0.5	mg/kg^	N	<0.6	<0.6
4,6-Dinitro-2-methylphenol	SVOCSW	0.2	mg/kg^	N	<0.3	<0.2
4-Bromophenyl-phenylether	SVOCSW	0.1	mg/kg^	U	<0.1* в	<0.1* в







Project Name: F2033-22-Crowle

Project No: 22120845

Date Issued: 23/12/2022

			001	002			
	Customer ID						
			Sam	ple Type	SOLID	SOLID	
			Samp	ling Date	07/12/2022	07/12/2022	
Analysis	Method Code	MDL	Units	Accred.			
4-Chloro-3-methylphenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	
4-Chloroaniline	SVOCSW	0.5	mg/kg^	N	<0.6	<0.6	
4-Chlorophenol	SVOCSW	0.5	mg/kg^	U	<0.6	<0.6	
4-Chlorophenyl-phenylether	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	
4-Nitroaniline	SVOCSW	0.6	mg/kg^	N	<0.8	<0.7	
4-Nitrophenol	SVOCSW	0.5	mg/kg^	N	<0.6	<0.6	
Acenaphthene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	
Acenaphthylene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	
Anthracene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	
Azobenzene	SVOCSW	0.3	mg/kg^	N	<0.4	<0.4	
Benzo[a]anthracene	SVOCSW	0.2	mg/kg^	U	<0.3	<0.2	
Benzo[a]pyrene	SVOCSW	0.2	mg/kg^	U	<0.3	<0.2	
Benzo[b]fluoranthene	SVOCSW	0.2	mg/kg^	U	<0.3	<0.2	
Benzo[g,h,i]perylene	SVOCSW	0.5	mg/kg^	U	<0.6	<0.6	
Benzo[k]fluoranthene	SVOCSW	0.2	mg/kg^	U	<0.3	<0.2	
Benzoic Acid	SVOCSW	0.5	mg/kg^	N	<0.6	<0.6	
Benzyl alcohol	SVOCSW	0.5	mg/kg^	U	<0.6* в	<0.6* в	
Biphenyl	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	
bis(2-Chloroethoxy)methane	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	







Project Name: F2033-22-Crowle

Project No: 22120845

Date Issued: 23/12/2022

			S	ample ID	001	002		
			0	tomer ID	WS04-E-6-ES-1.00-	WS04-E-8-ES-1.50-		
			Cus	tomer iD	1.00	1.50		
			Sam	ple Type	SOLID	SOLID		
			Samp	ling Date	07/12/2022	07/12/2022		
Analysis	Method Code	MDL	Units	Accred.				
bis(2-Chloroethyl)ether	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1		
bis(2-Chloroisopropyl)ether	SVOCSW	0.5	mg/kg^	U	<0.6	<0.6		
bis(2-Ethylhexyl)phthalate	SVOCSW	0.2	mg/kg^	U	<0.3	<0.2		
Butylbenzylphthalate	SVOCSW	0.2	mg/kg^	U	<0.3	<0.2		
Carbazole	SVOCSW	0.3	mg/kg^	N	<0.4	<0.4		
Chrysene	SVOCSW	0.2	mg/kg^	U	<0.3	<0.2		
Coronene	SVOCSW	0.3	mg/kg^	N	<0.4	<0.4		
Dibenzo[a,h]anthracene	SVOCSW	0.5	mg/kg^	U	<0.6	<0.6		
Dibenzofuran	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1		
Diethylphthalate	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1		
Dimethylphthalate	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1		
Di-n-butylphthalate	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1		
Di-n-octylphthalate	SVOCSW	0.2	mg/kg^	U	<0.3	<0.2		
Diphenyl ether	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1		
Fluoranthene	SVOCSW	0.2	mg/kg^	U	<0.3	<0.2		
Fluorene	SVOCSW	0.2	mg/kg^	U	<0.3	<0.2		
Hexachlorobenzene	SVOCSW	0.1	mg/kg^	U	<0.1* в	<0.1* в		
Hexachlorobutadiene	SVOCSW	0.1	mg/kg^	N	<0.1	<0.1		
Hexachlorocyclopentadiene	SVOCSW	0.1	mg/kg^	N	<0.1	<0.1		







Project Name: F2033-22-Crowle

Project No: 22120845

Date Issued: 23/12/2022

	001	002				
			Cus	stomer ID	WS04-E-6-ES-1.00- 1.00	WS04-E-8-ES-1.50- 1.50
			San	ple Type	SOLID	SOLID
			Samp	ling Date	07/12/2022	07/12/2022
Analysis	Method Code	MDL	Units	Accred.		
Hexachloroethane	SVOCSW	0.1	mg/kg^	U	<0.1* в	<0.1* в
Indeno[1,2,3-cd]pyrene	SVOCSW	0.5	mg/kg^	U	<0.6	<0.6
Isophorone	SVOCSW	0.1	mg/kg^	N	<0.1	<0.1
Naphthalene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
Nitrobenzene	SVOCSW	0.5	mg/kg^	U	<0.6	<0.6
N-Nitroso-di-n-propylamine	SVOCSW	0.9	mg/kg^	N	<1.2	<1.1
N-Nitrosodiphenylamine	SVOCSW	0.1	mg/kg^	N	<0.1	<0.1
Pentachlorophenol	SVOCSW	0.5	mg/kg^	N	<0.6	<0.6
Phenanthrene	SVOCSW	0.1	mg/kg^	U	0.2	<0.1
Phenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
Pyrene	SVOCSW	0.2	mg/kg^	U	<0.3* _B	<0.2* в
>C10-C12 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U	<5.19	<4.76
>C12-C16 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U	<5.19	5.79
>C16-C21 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U	<5.19	4.90
>C21-C35 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	10	mg/kg^	U	<13.0	15.4
Total TPH >C8-C40 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	20	mg/kg^	U	<26.0	29.9
>C10-C12 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U	<5.19	5.12
>C12-C16 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U	<5.19	13.0
>C16-C21 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U	6.42	13.6







Project Name: F2033-22-Crowle

Project No: 22120845

Date Issued: 23/12/2022

			S	ample ID	001	002
				stomer ID	WS04-E-6-ES-1.00- 1.00	WS04-E-8-ES-1.50- 1.50
			San	nple Type	SOLID	SOLID
			Samp	ling Date	07/12/2022	07/12/2022
Analysis	Method Code	MDL	Units	Accred.		
>C21-C35 (Aromatic)	TPHFIDUS (Aromatic)	10	mg/kg^	U	<13.0	36.7
EH_CU_1D_AR					10.0	00.7
Total TPH >C8-C40 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	20	mg/kg^	U	<26.0	79.9
Benzene	VOCHSAS	1	μg/kg^	UM	<1	<1
Ethylbenzene	VOCHSAS	2	μg/kg^	UM	<2	<2
m and p-Xylene	VOCHSAS	4	μg/kg^	UM	<5	<5
MTBE	VOCHSAS	1	μg/kg^	UM	<1	<1
o-Xylene	VOCHSAS	2	μg/kg^	UM	<2	<2
Toluene	VOCHSAS	5	μg/kg^	UM	16	25
1,1,1,2-Tetrachloroethane	VOCHSAS	1	μg/kg^	UM	<1	<1
1,1,1-Trichloroethane	VOCHSAS	1	μg/kg^	UM	<1	<1
1,1,2,2-Tetrachloroethane	VOCHSAS	1	μg/kg^	N	<1	<1
1,1,2-Trichloroethane	VOCHSAS	1	μg/kg^	UM	<1	<1
1,1-Dichloroethane	VOCHSAS	1	μg/kg^	UM	<1	<1
1,1-Dichloroethene	VOCHSAS	1	μg/kg^	U	<1	<1
1,1-Dichloropropene	VOCHSAS	1	μg/kg^	UM	<1	<1
1,2,3-Trichlorobenzene	VOCHSAS	3	μg/kg^	UM	<4	<3
1,2,3-Trichloropropane	VOCHSAS	1	μg/kg^	UM	<1	<1
1,2,4-Trichlorobenzene	VOCHSAS	3	μg/kg^	N	<4	<3
1,2,4-Trimethylbenzene	VOCHSAS	1	μg/kg^	UM	3	3







Project Name: F2033-22-Crowle

Project No: 22120845

Date Issued: 23/12/2022

			s	001	002	
			Cus	WS04-E-6-ES-1.00- 1.00	WS04-E-8-ES-1.50- 1.50	
			Sam	ple Type	SOLID	SOLID
			Samp	ling Date	07/12/2022	07/12/2022
Analysis	Method Code	MDL	Units	Accred.		
1,2-Dibromo-3-chloropropane	VOCHSAS	1	μg/kg^	U	<1	<1
1,2-Dibromoethane	VOCHSAS	1	μg/kg^	UM	<1	<1
1,2-Dichlorobenzene	VOCHSAS	1	μg/kg^	UM	<1	<1
1,2-Dichloroethane	VOCHSAS	1	μg/kg^	UM	<1	<1
1,2-Dichloropropane	VOCHSAS	1	μg/kg^	UM	<1* B	<1* B
1,3,5-Trimethylbenzene	VOCHSAS	1	μg/kg^	UM	2	<1
1,3-Dichlorobenzene	VOCHSAS	1	μg/kg^	UM	<1* B	<1* B
1,3-Dichloropropane	VOCHSAS	1	μg/kg^	UM	<1	<1
1,4-Dichlorobenzene	VOCHSAS	1	μg/kg^	UM	<1	<1
2,2-Dichloropropane	VOCHSAS	2	μg/kg^	UM	<2	<2
2-Chlorotoluene	VOCHSAS	1	μg/kg^	UM	<1	<1
4-Chlorotoluene	VOCHSAS	1	μg/kg^	UM	<1	<1
Benzene	VOCHSAS	1	μg/kg^	UM	<1	<1
Bromobenzene	VOCHSAS	1	μg/kg^	UM	<1	<1
Bromochloromethane	VOCHSAS	1	μg/kg^	UM	<1	<1
Bromodichloromethane	VOCHSAS	1	μg/kg^	UM	<1	<1
Bromoform	VOCHSAS	1	μg/kg^	UM	<1	<1
Bromomethane	VOCHSAS	1	μg/kg^	UM	<1* B	<1* B
Carbon Tetrachloride	VOCHSAS	1	μg/kg^	UM	<1	<1







Project Name: F2033-22-Crowle

Project No: 22120845

Date Issued: 23/12/2022

			S	ample ID	001	002
			Cus	WS04-E-6-ES-1.00- 1.00	WS04-E-8-ES-1.50- 1.50	
			San	nple Type	SOLID	SOLID
			Samp	ling Date	07/12/2022	07/12/2022
Analysis	Method Code	MDL	Units	Accred.		
Chlorobenzene	VOCHSAS	1	μg/kg^	UM	<1	<1
Chloroethane	VOCHSAS	2	μg/kg^	UM	<2	<2
Chloroform	VOCHSAS	1	μg/kg^	UM	<1	<1
Chloromethane	VOCHSAS	3	μg/kg^	U	<4* _B	<3* _B
cis 1,2-Dichloroethene	VOCHSAS	5	μg/kg^	UM	<6	<6
cis 1,3-Dichloropropene	VOCHSAS	1	μg/kg^	UM	<1	<1
Dibromochloromethane	VOCHSAS	1	μg/kg^	UM	<1	<1
Dibromomethane	VOCHSAS	1	μg/kg^	UM	<1	<1
Dichlorodifluoromethane	VOCHSAS	1	μg/kg^	N	<1	<1
Ethylbenzene	VOCHSAS	2	μg/kg^	UM	<2	<2
Hexachlorobutadiene	VOCHSAS	2	μg/kg^	N	<2	<2
iso-Propylbenzene	VOCHSAS	1	μg/kg^	UM	<1	<1
m and p-Xylene	VOCHSAS	4	μg/kg^	UM	<5	<5
MTBE	VOCHSAS	1	μg/kg^	UM	<1	<1
Naphthalene	VOCHSAS	5	μg/kg^	UM	33	11
n-Butylbenzene	VOCHSAS	1	μg/kg^	U	<1	<1
o-Xylene	VOCHSAS	2	μg/kg^	UM	<2	<2
p-Isopropyltoluene	VOCHSAS	1	μg/kg^	UM	<1	<1
Propylbenzene	VOCHSAS	1	μg/kg^	UM	<1	<1







Project Name: F2033-22-Crowle

Project No: 22120845

Date Issued: 23/12/2022

			S	ample ID	001	002
			Cus	stomer ID	WS04-E-6-ES-1.00- 1.00	WS04-E-8-ES-1.50- 1.50
			San	nple Type	SOLID	SOLID
			Samp	ling Date	07/12/2022	07/12/2022
Analysis	Method Code	MDL	Units	Accred.		
sec-Butylbenzene	VOCHSAS	1	μg/kg^	UM	<1	<1
Styrene	VOCHSAS	1	μg/kg^	UM	<1	<1
tert-Butylbenzene	VOCHSAS	1	μg/kg^	UM	<1	<1
Tetrachloroethene	VOCHSAS	3	μg/kg^	UM	<4	<3
Toluene	VOCHSAS	5	μg/kg^	UM	16	25
trans 1,2-Dichloroethene	VOCHSAS	1	μg/kg^	UM	<1	<1
trans 1,3-Dichloropropene	VOCHSAS	1	μg/kg^	UM	<1	<1
Trichloroethene	VOCHSAS	1	μg/kg^	U	3	6
Trichlorofluoromethane	VOCHSAS	1	μg/kg^	UM	<1* _B	<1* B
Vinyl Chloride	VOCHSAS	1	μg/kg^	UM	<1* _B	<1* B
Total Moisture at 35°C	CLANDPREP	0.1	%	N	23.0	15.9
Description of Solid Material	CLANDPREP		-	N	CLAY	CLAY
Redox Potential	SUB016		mV	N	300.68	269.99
Asbestos Identification	SUB020		-	N	NAIIS	NAIIS







CERTIFICATE OF ANALYSIS

ANALYSIS REQUESTED BY:

SOCOTEC UK Ltd

CONTRACT NO: \$29742-5

Environmental Chemistry PO Box 100

DATE OF ISSUE: 19.12.22

Burton upon Trent Staffordshire **DE15 0XD**

DATE SAMPLES RECEIVED: 12.12.22

DATE ANALYSIS COMPLETED: 16.12.22

DESCRIPTION: Two soil/loose aggregate samples each weighing approximately 0.6-1.1kg.

ANALYSIS REQUESTED: Qualitative and quantitative analysis of soil/loose aggregate samples for

mass determination of asbestos.

METHODS:

Qualitative - The samples were analysed qualitatively for asbestos by polarised light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative - The analysis was carried out using our documented in-house method based on HSE Contract Research Report No. 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire sample, detailed analysis of a representative sub-sample and quantification by hand picking/weighing and/or fibre counting/sizing as appropriate.

RESULTS:

Initial Screening

No asbestos was detected in any of the soil samples by stereo-binocular and polarised light microscopy.

A summary of the results is given in Table 1.







CONTRACT NO: \$29742-5 **DATE OF ISSUE:** 19.12.22

RESULTS: (cont.)

Table 1: Qualitative Results

SOCOTEC Job I.D: 22120845

IOM sample number	SOCOTEC Sample ID	Client Sample ID	ACM type detected	PLM result
S29742-10	22120845-001	WS04-E-6-ES-1.00-1.00	-	No Asbestos Detected
S29742-11	22120845-002	WS04-E-8-ES-1.50-1.50	-	No Asbestos Detected

Our detection limit for this method is 0.001%.

COMMENTS:

IOM Consulting cannot accept responsibility for samples that have been incorrectly collected or despatched by external clients.

Any opinions and interpretations expressed herein are out with the scope of our UKAS accreditation.





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Socotec ESG ESG House, Bretby Business Park Bretby Burton upon Trent

Attention:

Date: 20th December, 2022

Your reference : 22120845

Our reference: Test Report 22/20498 Batch 1

Location : Crowle

Date samples received: 10th December, 2022

Status: Final Report

Issue: 1

Two samples were received for analysis on 10th December, 2022 of which two were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.



Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Socotec

Reference: 22120845 Location: Crowle

Contact:

EMT Job No: 22/20498

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

ENT SOD NO.	22/20430				 		_		
EMT Sample No.	1	2							
Sample ID	22120845-001	22120845-002							
Depth							Please se	e attached n	otes for all
COC No / misc							abbrevi	ations and a	cronyms
Containers	J	J							
Sample Date	07/12/2022	07/12/2022							
Sample Type	Soil	Soil							
Batch Number		1					LOD/LOR	Units	Method
Date of Receipt									No.
Redox Potential	300.68	269.99						mV	TM139/PM0

Client Name: Socotec Reference: 22120845 Location: Crowle

Contact:

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason					
	No deviating sample report results for job 22/20498										

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 22/20498

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCI (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

EMT Job No.: 22/20498

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

ABBREVIATIONS and ACRONYMS USED

SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
В	Indicates analyte found in associated method blank.
DR	Dilution required.
М	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
СО	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
ТВ	Trip Blank Sample
ОС	Outside Calibration Range

Element Materials Technology

Method Code Appendix

EMT Job No: 22/20498

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM139	ASTM G200-09 (2014) Oxidation-Reduction potential of soil samples removed from the ground, using Redox probe and meter.	PM0	No preparation is required.			AR	No



Project Name: F2033-22-Crowle Project No: 22120845 Date Issued: 23/12/2022

Deviating Sample Report

All samples received in an appropriate condition with no deviancies noted with the samples.

Analysis Method

Method Code	Method Description	Analysis Method
BTEXHSA	BTEX by GCFID	As Received
CLANDPREP	Basic Solid Description	As Received
CLANDPREP	DW35 - CLand Prep and Dry Weight Correction to 35°C	As Received
GROHSA/BTEXHSA	GRO CWG (C5-C10) Ali/Aro Split	As Received
ICPACIDS	Sulphate as SO4 (Acid Soluble)	Air Dried & Ground
ICPBOR	Boron (Water Soluble) by ICPOES	Air Dried & Ground
ICPMSS	Arsenic in Solids by ICPMS	Air Dried & Ground
ICPMSS	Cadmium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Chromium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Copper in Solids by ICPMS	Air Dried & Ground
ICPMSS	Lead in Solids by ICPMS	Air Dried & Ground
ICPMSS	Mercury in Solids by ICPMS	Air Dried & Ground
ICPMSS	Nickel in Solids by ICPMS	Air Dried & Ground
ICPMSS	Selenium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Vanadium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Zinc in Solids by ICPMS	Air Dried & Ground
ICPWSS	Sulphate as SO4 (Water Soluble)	Air Dried & Ground
KONECL	Chloride (2:1) by Colorimetry	Air Dried & Ground
KONENS	Chromium VI (Hexavalent) by Colorimetry	Air Dried & Ground
PAHMSUS	17 PAHs (inc. Coronene) by GCMS	As Received
PHSOIL	pH (2.5:1)	As Received
SFAPI	Cyanide (Complex) by SFA	As Received
SFAPI	Cyanide (Free) by SFA	As Received
SFAPI	Cyanide (Total) by SFA	As Received
SFAPI	Phenol Index (Total) by SFA	As Received
SFAPI	Sulphide by SFA	As Received
SUB016	Redox Potential in Soil	
SUB020	Asbestos Stage 1 (with Stage 2+3 Trigger)	
SVOCSW	SVOCs (Target List) by GCMS	As Received
TPHFIDUS (Aliphatic)	TPH (CWG) Aliphatic Split with Carbon Banding	As Received
TPHFIDUS (Aromatic)	TPH (CWG) Aromatic Split with Carbon Banding	As Received
TSCONW	Electrical Conductivity (5:1)	Air Dried & Ground
VOCHSAS	BTEX & MTBE by GCMS	As Received
VOCHSAS	VOCs (Target List) by GCMS	As Received
WSLM59	SOM: Soil Organic Matter (%) (Calc)	Air Dried & Ground



Project Name: F2033-22-Crowle

Project No: 22120845 Date Issued: 23/12/2022

Result Report Notes

Letters alongside results signify that the result has associated report notes. The report notes are as follows:

Letter No	te
-----------	----

- A Due to the matrix of the sample the laboratory has had to deviate from our standard protocols to be able to process the sample and provide a result. Where applicable the accreditation has been removed and this should be taken into consideration when utilising the data.
- B The QC associated with this result has not wholly met the QMS requirements, the accreditation has therefore been removed. However, the Laboratory has confidence in the performance of the method as a whole and that the integrity of the data has not been significantly compromised.
- Due to matrix interference, the internal standard and/or surrogate has not met the QMS requirements. This should be taken into consideration when utilising the data.
- D A non-standard volume or mass has been used for this test which has resulted in a raised detection limit.
- E Due to the parameter value being beyond our calibration range (and following the maximum size of dilution allowed, where applicable), the result cannot be quantified and as such the result will appear as a greater than symbol (>) with the accreditation removed. This data should be used for indicative purposes only.
- F Based on the sample history, appearance and smell a dilution was applied prior to testing. Unfortunately, the result is either above (>) or below (<) our calibration range. Results above our calibration range have accreditation removed. The data should be used for indicative purposes only.
- G The day 5 oxygen reading was below the capability of the instrument to detect, and therefore the calculated BOD has been reported unaccredited for guidance purposes only.

HWOL Acronym Key

<u>Acronym</u> <u>Description</u>

HS Headspace Analysis

EH Extractable Hydrocarbons - i.e everything extracted by the solvent(s)

CU Clean up - e.g. by florisil, silica gel
1D GC - Single coil gas chromatography

Total Aliphatics & Aromatics

AL Aliphatics only AR Aromatics only

+ Operator to indicate cumulative e.g. EH_CU+HS_1D_Total



Project Name: F2033-22-Crowle

Project No: 22120845 Date Issued: 23/12/2022

Additional Information

This report refers to samples as received. SOCOTEC UK Ltd takes no responsibility for accuracy or competence of sampling by others.

Results within this report relate only to the samples tested.

The accreditation codes are as follows:

U = UKAS accredited analysis M = MCERT accredited analysis N = Unaccredited analysis

Any units marked with ^ signify results are reported on a dry weight basis of 35 ° C.

All Air Dried and Ground Samples (ADG) are oven dried at less than 35° c.

This report shall not be reproduced except in full, without written approval of the laboratory.

Opinions and interpretations given are outside the scope of our UKAS accreditation.

Any samples marked with * are not covered by our scope of UKAS accreditation. If applicable, further report notes have been added.

Any solid samples where the Major Constituents are not one of the following (Sand, Silt, Clay, Made Ground) are not one of our accredited matrix types.

Any samples marked with ‡ have had MCERTS accreditation removed for this result

Any samples marked with a tick in the deviant table is deviant for the specific reason.

Any samples reported as IS, NA, ND mean the following:

IS = Insufficient Sample to complete analysis

NA = Sample is not amenable for the required analysis

ND = Results cannot be determined

Items listed with a 'SUB' method code prefix have been carried out by an external subcontracted laboratory.

Our deviating sample report does not include deviancy information for Subcontracted analysis. Please see the report from the subcontracted lab for information regarding any deviancies for this analysis.

Summaries of analysis methods are available upon request.

End of Certificate of Analysis



Environmental Chemistry

Certificate of Analysis

Client: SOCOTEC Geotechnical

Project: 22121065

Quote: BEC220926768 V3.1

Project Ref: F2033-22

Site: F2033 Crowle

Contact:

Address: Geotechnical House

18-19 Drome Road

Deeside Flintshire CH5 2NY

E-Mail:

Phone:

No. Samples Received: 4

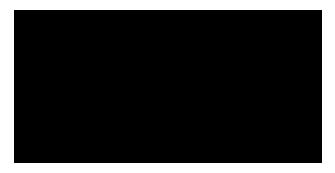
Date Received: 10/12/2022

Analysis Date: 22/12/2022

Date Issued: 22/12/2022

Report Type: Final Version 01

This report supersedes any versions previously issued by the laboratory



SOCOTEC Environmental Chemistry, Bretby Business Park, Ashby Road, Burton-Upon-Trent, DE15 0YZ



Project No: 22121065 Date Issued: 22/12/2022

Samples Analysed

Text ID	Sample Reference	Sampling Date	Sample Type	Sample Description
22121065-001	WS02-1-W-2.50	08/12/2022 16:38:00	WATER	Ground Water
22121065-002	WS05-1-W-2.50	08/12/2022 16:38:00	WATER	Ground Water
22121065-003	WS06-1-W-3.00	08/12/2022 16:38:00	WATER	Ground Water
22121065-004	BH01-1-W-4.00	08/12/2022 16:38:00	WATER	Ground Water



Project No: 22121065

Date Issued: 22/12/2022

			S	ample ID	001	002	003	004
			Cus	tomer ID	WS02-1-W-2.50	WS05-1-W-2.50	WS06-1-W-3.00	BH01-1-W-4.00
			Sam	ple Type	WATER	WATER	WATER	WATER
			Sampl	ling Date	08/12/2022	08/12/2022	08/12/2022	08/12/2022
Analysis	Method Code	MDL	Units	Accred.				
Ammoniacal Nitrogen as N	KONENS	0.01	mg/l	U	4.10	2.20	0.50	0.40
>C6-C7 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N	<0.100 в	<0.100 в	<0.100 в	<0.100 в
>C7-C8 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N	<0.100	<0.100	<0.100	<0.100
>C7-C8 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.005	mg/l	U	<0.005	<0.005	<0.005	<0.005
>C8-C10 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N	<0.100	<0.100	<0.100	<0.100
>C8-C10 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.02	mg/l	U	<0.020	<0.020	<0.020	<0.020
C5-C6 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.1	mg/l	N	<0.100	<0.100	<0.100	<0.100
C5-C7 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.005	mg/l	U	<0.005* в	<0.005* в	<0.005* в	<0.005* в
Total GRO C5-C10 HS_1D_Total	GROHSA/BTEXHSA	0.1	mg/l	U	<0.100	<0.100	<0.100	<0.100
Conductivity at 25°C	PHCONDW	100	μS/cm	U	1400	2430	1020	2640
рН	PHCONDW	1	pH units	U	6.8	6.7	6.7	7.3
Chloride as Cl	KONENS	1	mg/l	U	171	98	31	147
Chromium (VI) as Cr	KONENS	0.003	mg/l	U	<0.003	<0.003	<0.003	<0.003
Nitrate as N	KONENS	0.2	mg/l	U	<0.2	3.2	<0.2	<0.2
Free Cyanide	SFAPI	0.02	mg/l	U	<0.02	<0.02	<0.02	<0.02
Phenol Index	SFAPI	0.05	mg/l	U	<0.05	<0.05	<0.05	<0.05
Sulphide as S	SFAPI	0.02	mg/l	U	0.26	0.21	0.07	0.71
Total Cyanide	SFAPI	0.02	mg/l	U	<0.02	<0.02	<0.02	<0.02
Arsenic as As	ICPMSW (Dissolved)	0.001	mg/l	U	<0.001	0.002	<0.001	0.022





Project No: 22121065

Date Issued: 22/12/2022

			S	ample ID	001	002	003	004
			Cus	stomer ID	WS02-1-W-2.50	WS05-1-W-2.50	WS06-1-W-3.00	BH01-1-W-4.00
			Sample Type		WATER	WATER	WATER	WATER
			Samp	ling Date	08/12/2022	08/12/2022	08/12/2022	08/12/2022
Analysis	Method Code	MDL	Units	Accred.				
Cadmium as Cd	ICPMSW (Dissolved)	0.00002	mg/l	U	<0.00002	<0.00002	<0.00002	<0.00002
Total Chromium as Cr	ICPMSW (Dissolved)	0.001	mg/l	U	<0.001	0.001	<0.001	<0.001
Copper as Cu	ICPMSW (Dissolved)	0.001	mg/l	U	<0.001	0.003	0.002	<0.001
Lead as Pb	ICPMSW (Dissolved)	0.001	mg/l	U	<0.001	<0.001	<0.001	<0.001
Mercury as Hg	ICPMSW (Dissolved)	0.00003	mg/l	U	<0.00003	<0.00003	<0.00003	<0.00003
Nickel as Ni	ICPMSW (Dissolved)	0.001	mg/l	U	0.004	0.006	0.011	0.004
Selenium as Se	ICPMSW (Dissolved)	0.001	mg/l	U	<0.001	0.012	<0.001	<0.001
Vanadium as V	ICPMSW (Dissolved)	0.001	mg/l	U	<0.001	<0.001	<0.001	<0.001
Zinc as Zn	ICPMSW (Dissolved)	0.002	mg/l	U	0.009	0.020	0.041	<0.002
Barium as Ba	ICPWATVAR (Dissolved)	0.01	mg/l	U	0.15	0.19	0.17	0.04
Beryllium as Be	ICPWATVAR (Dissolved)	0.01	mg/l	N	<0.01	<0.01	<0.01	<0.01
Boron as B	ICPWATVAR (Dissolved)	0.01	mg/l	U	0.21	0.17	0.41	0.12
Calcium as Ca	ICPWATVAR (Dissolved)	1	mg/l	U	158	397	207	583
Magnesium as Mg	ICPWATVAR (Dissolved)	1	mg/l	U	54	119	29	91
Potassium as K	ICPWATVAR (Dissolved)	1	mg/l	U	33	6	13	5
Total Sulphur as SO4	ICPWATVAR (Dissolved)	3	mg/l	U	146	1180	454	1660
Sodium as Na	ICPWATVAR (Dissolved)	1	mg/l	U	81	162	18	117
Total Sulphur as S	ICPWATVAR (Dissolved)	1	mg/l	U	49	394	151	553
Total Hardness as CaCO3	ICPWATVAR (Dissolved)	6.6	mg/l	U	614	1600	636	2120





Project No: 22121065

Date Issued: 22/12/2022

		Sample ID			001	002	003	004
			Cu	stomer ID	WS02-1-W-2.50	WS05-1-W-2.50	WS06-1-W-3.00	BH01-1-W-4.00
			Sar	nple Type	WATER	WATER	WATER	WATER
			Samı	oling Date	08/12/2022	08/12/2022	08/12/2022	08/12/2022
Analysis	Method Code	MDL	Units	Accred.				
Benzene HS_1D_AR	BTEXHSA	5	μg/l	U	<5* B	<5* B	<5* B	<5* B
Ethylbenzene HS_1D_AR	BTEXHSA	5	μg/l	U	<5	<5	<5	<5
m/p-Xylene HS_1D_AR	BTEXHSA	10	μg/l	U	<10	<10	<10	<10
o-Xylene HS_1D_AR	BTEXHSA	5	μg/l	U	<5	<5	<5	<5
Toluene HS_1D_AR	BTEXHSA	5	μg/l	U	<5	<5	<5	<5
Acenaphthene	PAHMSW	0.01	μg/l	U	<0.04 D	<0.10 ₪	<0.10 p	<0.10 p
Acenaphthylene	PAHMSW	0.01	μg/l	U	<0.04 D	<0.10 ₪	<0.10 D	<0.10 D
Anthracene	PAHMSW	0.01	μg/l	U	<0.04 D	<0.10 p	<0.10 D	<0.10 D
Benzo[a]anthracene	PAHMSW	0.01	μg/l	U	<0.04 D	<0.10 p	<0.10 p	<0.10 p
Benzo[a]pyrene	PAHMSW	0.01	μg/l	U	0.10* в	<0.10* в,D	<0.10* в,D	<0.10* в,D
Benzo[b]fluoranthene	PAHMSW	0.01	μg/l	U	0.13	<0.10 p	<0.10 p	<0.10 p
Benzo[g,h,i]perylene	PAHMSW	0.01	μg/l	U	<0.04 D	<0.10 p	<0.10 p	<0.10 p
Benzo[k]fluoranthene	PAHMSW	0.01	μg/l	U	<0.04 D	<0.10 p	<0.10 p	<0.10 p
Chrysene	PAHMSW	0.01	μg/l	U	0.09	<0.10 p	<0.10 p	0.13
Coronene	PAHMSW	0.01	μg/l	U	<0.04 D	<0.10 p	<0.10 p	<0.10 p
Dibenzo[a,h]anthracene	PAHMSW	0.01	μg/l	U	<0.04 D	<0.10 p	<0.10 p	<0.10 p
Fluoranthene	PAHMSW	0.01	μg/l	U	0.14	<0.10 p	<0.10 p	0.16
Fluorene	PAHMSW	0.01	μg/l	U	<0.04 D	<0.10 p	<0.10 p	<0.10 p
Indeno[1,2,3-cd]pyrene	PAHMSW	0.01	μg/l	U	<0.04 D	<0.10 p	<0.10 p	<0.10 p
		-				1	1	1





Project No: 22121065

Date Issued: 22/12/2022

				Sample ID	001	002	003	004
			Cu	stomer ID		WS05-1-W-2.50	WS06-1-W-3.00 WATER 08/12/2022	BH01-1-W-4.00
			Sai	mple Type		WATER		WATER
			Sam	pling Date		08/12/2022		08/12/2022
Analysis	Method Code	MDL	Units	Accred.				
Naphthalene	PAHMSW	0.01	µg/l	U	<0.04 D	<0.10 p	<0.10 D	<0.10 D
Phenanthrene	PAHMSW	0.01	µg/l	U	0.05	<0.10 p	<0.10 p	<0.10 p
Pyrene	PAHMSW	0.01	μg/l	U	0.12	<0.10 ₪	<0.10 D	0.13
Total PAH 16	PAHMSW	0.16	µg/l	U	1.04	<1.60 ₪	<1.60 ₪	1.72
PCB 105	PCBECD	0.01	µg/l	N	<0.01	<0.01	<0.01	<0.01
PCB 114	PCBECD	0.01	μg/l	N	<0.01	<0.01	<0.01	<0.01
PCB 118	PCBECD	0.01	μg/l	N	<0.01	<0.01	<0.01	<0.01
PCB 123	PCBECD	0.01	μg/l	N	<0.01	<0.01	<0.01	<0.01
PCB 126	PCBECD	0.01	μg/l	N	<0.01	<0.01	<0.01	<0.01
PCB 156	PCBECD	0.01	μg/l	N	<0.01	<0.01	<0.01	<0.01
PCB 157	PCBECD	0.01	μg/l	N	<0.01	<0.01	<0.01	<0.01
PCB 167	PCBECD	0.01	μg/l	N	<0.01	<0.01	<0.01	<0.01
PCB 169	PCBECD	0.01	μg/l	N	<0.01	<0.01	<0.01	<0.01
PCB 189	PCBECD	0.01	μg/l	N	<0.01	<0.01	<0.01	<0.01
PCB 77	PCBECD	0.01	μg/l	N	<0.01	<0.01	<0.01	<0.01
PCB 81	PCBECD	0.01	μg/l	N	<0.01	<0.01	<0.01	<0.01
1,2,4-Trichlorobenzene	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c
1,2-Dichlorobenzene	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c
1,3-Dichlorobenzene	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c





Project No: 22121065

Date Issued: 22/12/2022

			s	ample ID	001	002	003	004 BH01-1-W-4.00 WATER 08/12/2022
			Cus	stomer ID	WATER	WS05-1-W-2.50	WS06-1-W-3.00 WATER 08/12/2022	
			Sam	ple Type		WATER		
			Samp	ling Date		08/12/2022		
Analysis	Method Code	MDL	Units	Accred.				
1,4-Dichlorobenzene	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c
1-Methylnaphthalene	svocsw	0.002	mg/l	N	<0.002	<0.002	<0.002	<0.002 c
2,4,5-Trichlorophenol	svocsw	0.02	mg/l	N	<0.020	<0.020	<0.020	<0.020 c
2,4,6-Trichlorophenol	svocsw	0.02	mg/l	N	<0.020	<0.020	<0.020	<0.020 c
2,4-Dichlorophenol	svocsw	0.02	mg/l	N	<0.020	<0.020	<0.020	<0.020 c
2,4-Dimethylphenol	SVOCSW	0.02	mg/l	N	<0.020	<0.020	<0.020	<0.020 c
2,4-Dinitrophenol	SVOCSW	0.01	mg/l	N	<0.010	<0.010	<0.010	<0.010 c
2,4-Dinitrotoluene	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c
2,6-Dinitrotoluene	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c
2-Chloronaphthalene	SVOCSW	0.002	mg/l	N	<0.002	<0.002	<0.002	<0.002 c
2-Chlorophenol	SVOCSW	0.02	mg/l	N	<0.020	<0.020	<0.020	<0.020 c
2-Methylnaphthalene	SVOCSW	0.002	mg/l	N	<0.002	<0.002	<0.002	<0.002 c
2-Methylphenol	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c
2-Nitroaniline	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c
2-Nitrophenol	SVOCSW	0.02	mg/l	N	<0.020	<0.020	<0.020	<0.020 c
3- & 4-Methylphenol	SVOCSW	0.02	mg/l	N	<0.020	<0.020	<0.020	<0.020 c
3-Nitroaniline	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c
4,6-Dinitro-2-methylphenol	SVOCSW	0.05	mg/l	N	<0.050	<0.050	<0.050	<0.050 c
4-Bromophenyl-phenylether	svocsw	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c





Project No: 22121065

Date Issued: 22/12/2022

	Sample ID				001	002	003 004		
					WS02-1-W-2.50	WS05-1-W-2.50	WS06-1-W-3.00	BH01-1-W-4.00	
			Cust	omer ID					
			Sam	ple Type	WATER	WATER	WATER	WATER	
			Sampl	ing Date	08/12/2022	08/12/2022	08/12/2022	08/12/2022	
Analysis	Method Code	MDL	Units	Accred.					
4-Chloro-3-methylphenol	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c	
4-Chloroaniline	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c	
4-Chlorophenol	SVOCSW	0.02	mg/l	N	<0.020	<0.020	<0.020	<0.020 c	
4-Chlorophenyl-phenylether	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c	
4-Nitroaniline	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c	
4-Nitrophenol	SVOCSW	0.05	mg/l	N	<0.050	<0.050	<0.050	<0.050 c	
Acenaphthene	SVOCSW	0.002	mg/l	N	<0.002	<0.002	<0.002	<0.002 c	
Acenaphthylene	SVOCSW	0.002	mg/l	N	<0.002	<0.002	<0.002	<0.002 c	
Anthracene	SVOCSW	0.002	mg/l	N	<0.002	<0.002	<0.002	<0.002 c	
Azobenzene	SVOCSW	0.01	mg/l	N	<0.010	<0.010	<0.010	<0.010 c	
Benzo[a]anthracene	SVOCSW	0.002	mg/l	N	<0.002	<0.002	<0.002	<0.002 c	
Benzo[a]pyrene	SVOCSW	0.002	mg/l	N	<0.002	<0.002	<0.002	<0.002 c	
Benzo[b]fluoranthene	SVOCSW	0.002	mg/l	N	<0.002	<0.002	<0.002	<0.002 c	
Benzo[g,h,i]perylene	SVOCSW	0.002	mg/l	N	<0.002	<0.002	<0.002	<0.002 c	
Benzo[k]fluoranthene	SVOCSW	0.002	mg/l	N	<0.002	<0.002	<0.002	<0.002 c	
Benzoic Acid	SVOCSW	0.1	mg/l	N	<0.100	<0.100	<0.100	<0.100 c	
Benzyl alcohol	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c	
Biphenyl	SVOCSW	0.002	mg/l	N	<0.002	<0.002	<0.002	<0.002 c	
bis(2-Chloroethoxy)methane	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c	





Project No: 22121065

Date Issued: 22/12/2022

	Sample ID				001	002	02 003 004		
			Cura	omer ID	WS02-1-W-2.50	WS05-1-W-2.50	WS06-1-W-3.00	BH01-1-W-4.00	
			Cust	omer ID					
			Samı	ole Type	WATER	WATER	WATER	WATER	
			Sampli	ng Date	08/12/2022	08/12/2022	08/12/2022	08/12/2022	
Analysis	Method Code	MDL	Units	Accred.					
bis(2-Chloroethyl)ether	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c	
bis(2-Chloroisopropyl)ether	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c	
bis(2-Ethylhexyl)phthalate	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c	
Butylbenzylphthalate	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c	
Carbazole	SVOCSW	0.01	mg/l	N	<0.010	<0.010	<0.010	<0.010 c	
Chrysene	SVOCSW	0.002	mg/l	N	<0.002	<0.002	<0.002	<0.002 c	
Coronene	SVOCSW	0.05	mg/l	N	<0.050	<0.050	<0.050	<0.050 c	
Dibenzo[a,h]anthracene	SVOCSW	0.002	mg/l	N	<0.002	<0.002	<0.002	<0.002 c	
Dibenzofuran	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c	
Diethylphthalate	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c	
Dimethylphthalate	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c	
Di-n-butylphthalate	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c	
Di-n-octylphthalate	SVOCSW	0.002	mg/l	N	<0.002	<0.002	<0.002	<0.002 c	
Diphenyl ether	SVOCSW	0.002	mg/l	N	<0.002	<0.002	<0.002	<0.002 c	
Fluoranthene	SVOCSW	0.002	mg/l	N	<0.002	<0.002	<0.002	<0.002 c	
Fluorene	SVOCSW	0.002	mg/l	N	<0.002	<0.002	<0.002	<0.002 c	
Hexachlorobenzene	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c	
Hexachlorobutadiene	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c	
Hexachlorocyclopentadiene	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c	





Project No: 22121065

Date Issued: 22/12/2022

			:	Sample ID	001	002	003	004
			Cu	stomer ID	WS02-1-W-2.50	WS05-1-W-2.50	WS06-1-W-3.00	BH01-1-W-4.00
			Sar	nple Type	WATER	WATER	WATER	WATER
			Samı	oling Date	08/12/2022	08/12/2022	08/12/2022	08/12/2022
Analysis	Method Code	MDL	Units	Accred.				
Hexachloroethane	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c
Indeno[1,2,3-cd]pyrene	svocsw	0.002	mg/l	N	<0.002	<0.002	<0.002	<0.002 c
Isophorone	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c
Naphthalene	SVOCSW	0.002	mg/l	N	<0.002	<0.002	<0.002	<0.002 c
Nitrobenzene	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c
N-Nitroso-di-n-propylamine	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c
N-Nitrosodiphenylamine	SVOCSW	0.005	mg/l	N	<0.005	<0.005	<0.005	<0.005 c
Pentachlorophenol	SVOCSW	0.05	mg/l	N	<0.050	<0.050	<0.050	<0.050 c
Phenanthrene	SVOCSW	0.002	mg/l	N	<0.002	<0.002	<0.002	<0.002 c
Phenol	SVOCSW	0.02	mg/l	N	<0.020	<0.020	<0.020	<0.020 c
Pyrene	SVOCSW	0.002	mg/l	N	<0.002	<0.002	<0.002	<0.002 c
>C10-C12 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	<0.10 p	<0.10 p	<0.10 p	<0.10 p
>C12-C16 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	<0.10 p	<0.10 p	0.12	0.15
>C16-C21 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	<0.10 p	<0.10 p	0.12	0.13
>C21-C35 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	0.19	0.13	0.28	0.31
Total TPH >C8-C40 (Aliphatic) EH_CU_1D_AL	TPHFID (Aliphatic)	0.01	mg/l	U	0.41	0.32	0.67	0.80
>C10-C12 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	<0.10 p	<0.10 p	<0.10 p	<0.10 p
>C12-C16 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	<0.10 p	<0.10 p	<0.10 p	<0.10 p
>C16-C21 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	<0.10 D	<0.10 p	<0.10 D	<0.10 p





Project No: 22121065

Date Issued: 22/12/2022

			Sample ID		001	002	003	004
			Cu	stomer ID	WS02-1-W-2.50	WS05-1-W-2.50	WS06-1-W-3.00	BH01-1-W-4.00
			San	nple Type	WATER	WATER	WATER	WATER
			Samp	ling Date	08/12/2022	08/12/2022	08/12/2022	08/12/2022
Analysis	Method Code	MDL	Units	Accred.				
>C21-C35 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	<0.10 p	<0.10 p	<0.10 p	<0.10 p
Total TPH >C8-C40 (Aromatic) EH_CU_1D_AR	TPHFID (Aromatic)	0.01	mg/l	U	<0.10 D	0.13	0.10	0.15
1,1,1,2-Tetrachloroethane	VOCHSAW	1	μg/l	U	<1	<1	<1	<1
1,1,1-Trichloroethane	VOCHSAW	1	μg/l	U	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	VOCHSAW	1	µg/l	N	<1	<1	<1	<1
1,1,2-Trichloroethane	VOCHSAW	1	μg/l	U	<1* _B	<1* _B	<1* _B	<1* _B
1,1-Dichloroethane	VOCHSAW	1	μg/l	U	<1	<1	<1	<1
1,1-Dichloroethene	VOCHSAW	1	μg/l	U	<1	<1	<1	<1
1,1-Dichloropropene	VOCHSAW	1	µg/l	U	<1	<1	<1	<1
1,2,3-Trichlorobenzene	VOCHSAW	5	μg/l	U	<5	<5	<5	<5
1,2,3-Trichloropropane	VOCHSAW	1	μg/l	U	<1	<1	<1	<1
1,2,4-Trichlorobenzene	VOCHSAW	5	μg/l	U	<5	<5	<5	<5
1,2,4-Trimethylbenzene	VOCHSAW	1	μg/l	U	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	VOCHSAW	5	μg/l	U	<5	<5	<5	<5
1,2-Dibromoethane	VOCHSAW	1	μg/l	U	<1	<1	<1	<1
1,2-Dichlorobenzene	VOCHSAW	5	μg/l	U	<5	<5	<5	<5
1,2-Dichloroethane	VOCHSAW	1	μg/l	U	<1	<1	<1	<1
1,2-Dichloropropane	VOCHSAW	1	μg/l	U	<1	<1	<1	<1
1,3,5-Trimethylbenzene	VOCHSAW	0.6	μg/l	U	<0.6	<0.6	<0.6	<0.6





Project No: 22121065

Date Issued: 22/12/2022

			;	Sample ID	001	002	003	004
			Cu	stomer ID	WS02-1-W-2.50	WS05-1-W-2.50	WS06-1-W-3.00	BH01-1-W-4.00
			Sar	nple Type	WATER	WATER	WATER	WATER
			Samı	oling Date	08/12/2022	08/12/2022	08/12/2022	08/12/2022
Analysis	Method Code	MDL	Units	Accred.				
1,3-Dichlorobenzene	VOCHSAW	1	µg/l	U	<1	<1	<1	<1
1,3-Dichloropropane	VOCHSAW	1	μg/l	N	<1	<1	<1	<1
1,4-Dichlorobenzene	VOCHSAW	1	μg/l	U	<1	<1	<1	<1
2,2-Dichloropropane	VOCHSAW	1	μg/l	N	<1	<1	<1	<1
2-Chlorotoluene	VOCHSAW	1	μg/l	U	<1	<1	<1	<1
4-Chlorotoluene	VOCHSAW	1	μg/l	U	<1	<1	<1	<1
Benzene	VOCHSAW	1	μg/l	U	<1	<1	<1	<1
Bromobenzene	VOCHSAW	1	μg/l	U	<1	<1	<1	<1
Bromochloromethane	VOCHSAW	1	μg/l	U	<1	<1	<1	<1
Bromodichloromethane	VOCHSAW	1	μg/l	U	<1	<1	<1	<1
Bromoform	VOCHSAW	1	μg/l	U	<1	<1	<1	<1
Bromomethane	VOCHSAW	5	μg/l	N	<5	<5	<5	<5
Carbon Tetrachloride	VOCHSAW	1	μg/l	U	<1	<1	<1	<1
Chlorobenzene	VOCHSAW	1	μg/l	U	<1	<1	<1	<1
Chloroethane	VOCHSAW	5	μg/l	U	<5	<5	<5	<5
Chloroform	VOCHSAW	5	μg/l	U	<5	<5	<5	<5
Chloromethane	VOCHSAW	1	μg/l	U	<1* _B	<1* _B	<1* _B	<1* _B
cis 1,2-Dichloroethene	VOCHSAW	1	μg/l	U	<1	<1	<1	<1
cis 1,3-Dichloropropene	VOCHSAW	1	μg/l	N	<1	<1	<1	<1





Project No: 22121065

Date Issued: 22/12/2022

			S	Sample ID	001	002	003	004
			Cus	stomer ID	WS02-1-W-2.50	WS05-1-W-2.50	WS06-1-W-3.00	BH01-1-W-4.00
			San	nple Type	WATER	WATER	WATER	WATER
				ling Date	08/12/2022	08/12/2022	08/12/2022	08/12/2022
Analysis	Method Code	MDL	Units	Accred.				
Dibromochloromethane	VOCHSAW	1	μg/l	U	<1	<1	<1	<1
2 Distribution of the tribute	VOORION		pg/i		<1			<u> </u>
Dibromomethane	VOCHSAW	1	μg/l	U	<1	<1	<1	<1
Dichlorodifluoromethane	VOCHSAW	1	μg/l	N	<1	<1	<1	<1
Ethylbenzene	VOCHSAW	0.5	μg/l	U	<0.5	<0.5	<0.5	<0.5
Hexachlorobutadiene	VOCHSAW	5	μg/l	U	<5	<5	<5	<5
iso-Propylbenzene	VOCHSAW	1	μg/l	U	<1	<1	<1	<1
m and p-Xylene	VOCHSAW	1	μg/l	U	<1	<1	<1	<1
MTBE	VOCHSAW	1	μg/l	N	<1	<1	<1	<1
Naphthalene	VOCHSAW	5	μg/l	U	<5	<5	<5	<5
n-Butylbenzene	VOCHSAW	1	µg/l	U	<1	<1	<1	<1
o-Xylene	VOCHSAW	1	μg/l	U	<1	<1	<1	<1
p-Isopropyltoluene	VOCHSAW	1	μg/l	U	<1	<1	<1	<1
Propylbenzene	VOCHSAW	1	µg/l	U	<1* _B	<1* _B	<1* _B	<1* _B
sec-Butylbenzene	VOCHSAW	1	µg/l	U	<1	<1	<1	<1
Styrene	VOCHSAW	1	µg/l	U	<1	<1	<1	<1
tert-Butylbenzene	VOCHSAW	1	µg/l	U	<1	<1	<1	<1
Tetrachloroethene	VOCHSAW	5	μg/l	U	<5	<5	<5	<5
Toluene	VOCHSAW	1	µg/l	U	<1	<1	<1	<1
trans 1,2-Dichloroethene	VOCHSAW	1	μg/l	U	<1	<1	<1	<1



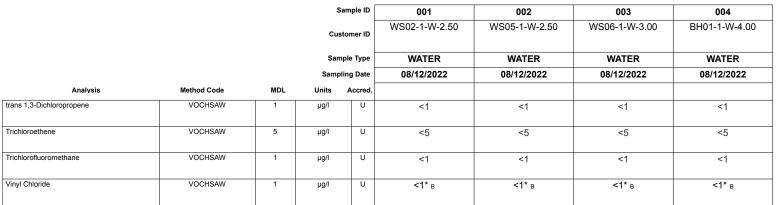


Project No: 22121065 Date Issued: 22/12/2022

Analysis Results

Trichloroethene

Vinyl Chloride







Project No: 22121065

Date Issued: 22/12/2022

Deviating Sample Report

All samples received in an appropriate condition with no deviancies noted with the samples.

Analysis Method

Method Code	Method Description	Analysis Method
BTEXHSA	BTEX by GCFID	Unfiltered
GROHSA/BTEXHSA	GRO CWG (C5-C10) Ali/Aro Split	Unfiltered
ICPMSW (Dissolved)	Arsenic (Diss.) in Water by ICPMS	Filtered
ICPMSW (Dissolved)	Cadmium (Diss.) in Water by ICPMS	Filtered
ICPMSW (Dissolved)	Chromium (Diss.) in Water by ICPMS	Filtered
ICPMSW (Dissolved)	Copper (Diss.) in Water by ICPMS	Filtered
ICPMSW (Dissolved)	Lead (Diss.) in Water by ICPMS	Filtered
ICPMSW (Dissolved)	Mercury (Diss.) in Water by ICPMS	Filtered
ICPMSW (Dissolved)	Nickel (Diss.) in Water by ICPMS	Filtered
ICPMSW (Dissolved)	Selenium (Diss.) in Water by ICPMS	Filtered
ICPMSW (Dissolved)	Vanadium (Diss.) in Water by ICPMS	Filtered
ICPMSW (Dissolved)	Zinc (Diss.) in Water by ICPMS	Filtered
ICPWATVAR (Dissolved)	Barium (Diss.) in Water by ICPOES	Filtered
ICPWATVAR (Dissolved)	Beryllium (Diss.) in Water by ICPOES	Filtered
ICPWATVAR (Dissolved)	Boron (Diss.) in Water by ICPOES	Filtered
ICPWATVAR (Dissolved)	Calcium (Diss.) in Water by ICPOES	Filtered
ICPWATVAR (Dissolved)	Magnesium (Diss.) in Water by ICPOES	Filtered
ICPWATVAR (Dissolved)	Potassium (Diss.) in Water by ICPOES	Filtered
ICPWATVAR (Dissolved)	Sodium (Diss.) in Water by ICPOES	Filtered
ICPWATVAR (Dissolved)	Total Hardness as CaCO3 in Water	Filtered
ICPWATVAR (Dissolved)	Total Sulphur as S (Diss.) in Water	Filtered
ICPWATVAR (Dissolved)	Total Sulphur as SO4 (Diss.) in Water	Filtered
KONENS	Ammoniacal Nitrogen as N	Filtered
KONENS	Chloride by Colorimetry	Filtered
KONENS	Chromium VI (Hexavalent) by Colorimetry	Filtered
KONENS	Nitrate as N by Colorimetry	Filtered
PAHMSW	17 PAHs (inc. Coronene) by GCMS	Unfiltered
PCBECD	PCBs, CLEA 12 Congeners	Unfiltered
PHCONDW	Electrical Conductivity @ 25°C	Unfiltered
PHCONDW	рН	Unfiltered
SFAPI	Cyanide (Free) by SFA	Unfiltered
SFAPI	Cyanide (Total) by SFA	Unfiltered
SFAPI	Phenol Index (Total) by SFA	Unfiltered
SFAPI	Sulphide by SFA	Unfiltered
SVOCSW	SVOCs (Target List) by GCMS	Unfiltered
TPHFID (Aliphatic)	TPH (CWG) Aliphatic Split with Carbon Banding	Unfiltered
TPHFID (Aromatic)	TPH (CWG) Aromatic Split with Carbon Banding	Unfiltered
VOCHSAW	VOCs (Target List) by GCMS	Unfiltered



Project No: 22121065 Date Issued: 22/12/2022

Result Report Notes

Letters alongside results signify that the result has associated report notes. The report notes are as follows:

Le	tte	r	N	ot	е

- A Due to the matrix of the sample the laboratory has had to deviate from our standard protocols to be able to process the sample and provide a result. Where applicable the accreditation has been removed and this should be taken into consideration when utilising the data.
- B The QC associated with this result has not wholly met the QMS requirements, the accreditation has therefore been removed. However, the Laboratory has confidence in the performance of the method as a whole and that the integrity of the data has not been significantly compromised.
- Due to matrix interference, the internal standard and/or surrogate has not met the QMS requirements. This should be taken into consideration when utilising the data.
- D A non-standard volume or mass has been used for this test which has resulted in a raised detection limit.
- E Due to the parameter value being beyond our calibration range (and following the maximum size of dilution allowed, where applicable), the result cannot be quantified and as such the result will appear as a greater than symbol (>) with the accreditation removed. This data should be used for indicative purposes only.
- F Based on the sample history, appearance and smell a dilution was applied prior to testing. Unfortunately, the result is either above (>) or below (<) our calibration range. Results above our calibration range have accreditation removed. The data should be used for indicative purposes only.
- G The day 5 oxygen reading was below the capability of the instrument to detect, and therefore the calculated BOD has been reported unaccredited for guidance purposes only.

HWOL Acronym Key

<u>Acronym</u> <u>Description</u>

HS Headspace Analysis

EH Extractable Hydrocarbons - i.e everything extracted by the solvent(s)

CU Clean up - e.g. by florisil, silica gel
1D GC - Single coil gas chromatography

Total Aliphatics & Aromatics

AL Aliphatics only AR Aromatics only

+ Operator to indicate cumulative e.g. EH_CU+HS_1D_Total



Project No: 22121065 Date Issued: 22/12/2022

Additional Information

This report refers to samples as received. SOCOTEC UK Ltd takes no responsibility for accuracy or competence of sampling by others.

Results within this report relate only to the samples tested.

The accreditation codes are as follows:

U = UKAS accredited analysis M = MCERT accredited analysis N = Unaccredited analysis

Any units marked with ^ signify results are reported on a dry weight basis of 105 ° c.

All Air Dried and Ground Samples (ADG) are oven dried at less than 35° c.

This report shall not be reproduced except in full, without written approval of the laboratory.

Opinions and interpretations given are outside the scope of our UKAS accreditation.

Any samples marked with * are not covered by our scope of UKAS accreditation. If applicable, further report notes have been added.

Any solid samples where the Major Constituents are not one of the following (Sand, Silt, Clay, Made Ground) are not one of our accredited matrix types.

Any samples marked with ‡ have had MCERTS accreditation removed for this result

Any samples marked with a tick in the deviant table is deviant for the specific reason.

Any samples reported as IS, NA, ND mean the following:

IS = Insufficient Sample to complete analysis

NA = Sample is not amenable for the required analysis

ND = Results cannot be determined

Items listed with a 'SUB' method code prefix have been carried out by an external subcontracted laboratory.

Our deviating sample report does not include deviancy information for Subcontracted analysis. Please see the report from the subcontracted lab for information regarding any deviancies for this analysis.

Summaries of analysis methods are available upon request.

End of Certificate of Analysis



Environmental Chemistry

Certificate of Analysis

Client: SOCOTEC Geotechnical

Project: 22121193

Quote: BEC221027085 V1.1

Project Ref: F2033-22

Site: Crowle

Contact:

Address: Geotechnical House

18-19 Drome Road

Deeside Flintshire CH5 2NY

E-Mail:

Phone:

No. Samples Received: 1

Date Received: 12/12/2022

Analysis Date: 29/12/2022

Date Issued: 29/12/2022

Report Type: Final Version 01

This report supersedes any versions previously issued by the laboratory



SOCOTEC Environmental Chemistry, Bretby Business Park, Ashby Road, Burton-Upon-Trent, DE15 0YZ



Project Name: F2033-22-Crowle

Project No: 22121193 Date Issued: 29/12/2022

Samples Analysed

<u>lext ID</u>	Sample Reference	Sampling Date	Sample Type	Sample Description
22121193-001	WS09-C-4-ES-0.90-0.90	08/12/2022 13:34:00	SOLID	Soil Sample



Project Name: F2033-22-Crowle

Project No: 22121193

Date Issued: 29/12/2022

	ample ID	001			
			Cus	tomer ID	WS09-C-4-ES-0.90- 0.90
			Sam	ple Type	SOLID
			Samp	ling Date	08/12/2022
Analysis	Method Code	MDL	Units	Accred.	
>C6-C7 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.235
>C7-C8 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.235
>C7-C8 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.01	mg/kg^	UM	<0.012
>C8-C10 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.235* в
>C8-C10 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.04	mg/kg^	UM	<0.048* в
C5-C6 Aliphatic HS_1D_AL	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.235
C5-C7 Aromatic HS_1D_AR	GROHSA/BTEXHSA	0.01	mg/kg^	UM	<0.012
Total GRO C5-C10 HS_1D_Total	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.235
pH (2.5:1 extraction)	PHSOIL	1	pH units	UM	8.3
Conductivity in 5:1 Water Extract	TSCONW	10	μS/cm	N	206
Chloride as Cl	KONECL	2	mg/kg^	N	46
Chromium (VI) as Cr	KONENS	0.1	mg/kg^	N	<0.1
Complex Cyanide	SFAPI	0.5	mg/kg^	UM	<0.5
Free Cyanide	SFAPI	0.5	mg/kg^	UM	<0.5
Phenol Index	SFAPI	0.5	mg/kg^	U	<0.5
Sulphide as S	SFAPI	0.5	mg/kg^	N	<0.6
Total Cyanide	SFAPI	0.5	mg/kg^	UM	<0.5
Soil Organic Matter	WSLM59	0.04	% m/m^	U	0.63
Arsenic as As	ICPMSS	0.3	mg/kg^	UM	4.1







Project Name: F2033-22-Crowle

Project No: 22121193

Date Issued: 29/12/2022

	ample ID	001			
			Cus	tomer ID	WS09-C-4-ES-0.90- 0.90
			Sam	ple Type	SOLID
			Samp	ling Date	08/12/2022
Analysis	Method Code	MDL	Units	Accred.	
Cadmium as Cd	ICPMSS	0.2	mg/kg^	UM	2.0
Copper as Cu	ICPMSS	1.6	mg/kg^	UM	15.7
Lead as Pb	ICPMSS	0.7	mg/kg^	UM	33.8
Mercury as Hg	ICPMSS	0.5	mg/kg^	UM	<0.5
Nickel as Ni	ICPMSS	2	mg/kg^	UM	16.2
Selenium as Se	ICPMSS	0.5	mg/kg^	UM	<0.5
Total Chromium as Cr	ICPMSS	1.2	mg/kg^	UM	13.7
Vanadium as V	ICPMSS	0.6	mg/kg^	N	15.7
Zinc as Zn	ICPMSS	16	mg/kg^	UM	193.1
Boron as B	ICPBOR	0.5	mg/kg^	UM	1.1
Water Soluble Sulphate as SO4 by Mass	ICPWSS	20	mg/kg^	UM	124
Acid Soluble Sulphate as SO4	ICPACIDS	20	mg/kg^	UM	326
Benzene HS_1D_AR	BTEXHSA	10	μg/kg^	UM	<12
Ethylbenzene HS_1D_AR	BTEXHSA	10	μg/kg^	UM	<12
m/p-Xylene HS_1D_AR	BTEXHSA	20	µg/kg^	UM	<24
o-Xylene HS_1D_AR	BTEXHSA	10	μg/kg^	UM	<12* в
Toluene HS_1D_AR	BTEXHSA	10	μg/kg^	UM	<12
Acenaphthene	PAHMSUS	0.08	mg/kg^	UM	<0.09
Acenaphthylene	PAHMSUS	0.08	mg/kg^	U	<0.09







Project Name: F2033-22-Crowle

Project No: 22121193

Date Issued: 29/12/2022

			s	ample ID	D 001	
			Cua	tomer ID	WS09-C-4-ES-0.90-	
			Cus	tomer ib	0.90	
			Sam	ple Type	SOLID	
			Samp	ling Date	08/12/2022	
Analysis	Method Code	MDL	Units	Accred.		
Anthracene	PAHMSUS	0.08	mg/kg^	U	0.25	
Benzo[a]anthracene	PAHMSUS	0.08	mg/kg^	UM	0.35	
Benzo[a]pyrene	PAHMSUS	0.08	mg/kg^	UM	0.46	
Benzo[b]fluoranthene	PAHMSUS	0.08	mg/kg^	UM	0.43	
Benzo[g,h,i]perylene	PAHMSUS	0.08	mg/kg^	UM	0.22	
Benzo[k]fluoranthene	PAHMSUS	0.08	mg/kg^	UM	0.35	
Chrysene	PAHMSUS	0.08	mg/kg^	UM	0.79	
Coronene	PAHMSUS	0.08	mg/kg^	N	<0.09	
Dibenzo[a,h]anthracene	PAHMSUS	0.08	mg/kg^	UM	<0.09	
Fluoranthene	PAHMSUS	0.08	mg/kg^	UM	0.81	
Fluorene	PAHMSUS	0.08	mg/kg^	UM	0.10	
Indeno[1,2,3-cd]pyrene	PAHMSUS	0.08	mg/kg^	UM	0.31	
Naphthalene	PAHMSUS	0.08	mg/kg^	UM	<0.09	
Phenanthrene	PAHMSUS	0.08	mg/kg^	UM	0.39	
Pyrene	PAHMSUS	0.08	mg/kg^	UM	0.99	
Total PAH 16	PAHMSUS	1.28	mg/kg^	U	5.81	
1,2,4-Trichlorobenzene	SVOCSW	0.1	mg/kg^	N	<0.1	
1,2-Dichlorobenzene	SVOCSW	0.1	mg/kg^	U	<0.1	
1,3-Dichlorobenzene	SVOCSW	0.1	mg/kg^	U	<0.1	







Project Name: F2033-22-Crowle

Project No: 22121193

Date Issued: 29/12/2022

			s	ample ID	001
			Cus	tomer ID	WS09-C-4-ES-0.90- 0.90
			Sam	ple Type	SOLID
			Samp	ling Date	08/12/2022
Analysis	Method Code	MDL	Units	Accred.	
1,4-Dichlorobenzene	SVOCSW	0.1	mg/kg^	U	<0.1
1-Methylnaphthalene	SVOCSW	0.1	mg/kg^	U	<0.1
2,4,5-Trichlorophenol	SVOCSW	0.1	mg/kg^	U	<0.1
2,4,6-Trichlorophenol	SVOCSW	0.1	mg/kg^	U	<0.1
2,4-Dichlorophenol	SVOCSW	0.1	mg/kg^	U	<0.1
2,4-Dimethylphenol	SVOCSW	0.1	mg/kg^	U	<0.1
2,4-Dinitrophenol	SVOCSW	0.5	mg/kg^	N	<0.6
2,4-Dinitrotoluene	SVOCSW	0.2	mg/kg^	U	<0.2
2,6-Dinitrotoluene	SVOCSW	0.5	mg/kg^	U	<0.6
2-Chloronaphthalene	SVOCSW	0.1	mg/kg^	U	<0.1
2-Chlorophenol	SVOCSW	0.1	mg/kg^	U	<0.1
2-Methylnaphthalene	SVOCSW	0.1	mg/kg^	U	<0.1
2-Methylphenol	SVOCSW	0.1	mg/kg^	U	<0.1
2-Nitroaniline	SVOCSW	0.5	mg/kg^	N	<0.6
2-Nitrophenol	SVOCSW	0.1	mg/kg^	U	<0.1
3- & 4-Methylphenol	SVOCSW	0.1	mg/kg^	U	<0.1
3-Nitroaniline	svocsw	0.5	mg/kg^	N	<0.6
4,6-Dinitro-2-methylphenol	SVOCSW	0.2	mg/kg^	N	<0.2
4-Bromophenyl-phenylether	svocsw	0.1	mg/kg^	U	<0.1







Project Name: F2033-22-Crowle

Project No: 22121193

Date Issued: 29/12/2022

			S	ample ID	001
			Cus	tomer ID	WS09-C-4-ES-0.90- 0.90
			Sam	ple Type	SOLID
			Sampl	ing Date	08/12/2022
Analysis	Method Code	MDL	Units	Accred.	
4-Chloro-3-methylphenol	SVOCSW	0.1	mg/kg^	U	<0.1
4-Chloroaniline	SVOCSW	0.5	mg/kg^	N	<0.6
4-Chlorophenol	SVOCSW	0.5	mg/kg^	U	<0.6
4-Chlorophenyl-phenylether	SVOCSW	0.1	mg/kg^	U	<0.1
4-Nitroaniline	SVOCSW	0.6	mg/kg^	N	<0.7
4-Nitrophenol	SVOCSW	0.5	mg/kg^	N	<0.6
Acenaphthene	SVOCSW	0.1	mg/kg^	U	<0.1
Acenaphthylene	SVOCSW	0.1	mg/kg^	U	0.3
Anthracene	SVOCSW	0.1	mg/kg^	U	0.3
Azobenzene	SVOCSW	0.3	mg/kg^	N	<0.4
Benzo[a]anthracene	SVOCSW	0.2	mg/kg^	U	2.5
Benzo[a]pyrene	SVOCSW	0.2	mg/kg^	U	2.3
Benzo[b]fluoranthene	SVOCSW	0.2	mg/kg^	U	2.5
Benzo[g,h,i]perylene	SVOCSW	0.5	mg/kg^	U	1.0
Benzo[k]fluoranthene	SVOCSW	0.2	mg/kg^	U	1.0
Benzoic Acid	SVOCSW	0.5	mg/kg^	N	<0.6
Benzyl alcohol	SVOCSW	0.5	mg/kg^	U	<0.6
Biphenyl	SVOCSW	0.1	mg/kg^	U	<0.1
bis(2-Chloroethoxy)methane	SVOCSW	0.1	mg/kg^	U	<0.1







Project Name: F2033-22-Crowle

Project No: 22121193

Date Issued: 29/12/2022

			Si	ample ID	001
					WS09-C-4-ES-0.90-
			Cus	tomer ID	0.90
			_		
				ple Type	SOLID
				ing Date	08/12/2022
Analysis	Method Code	MDL	Units	Accred.	
bis(2-Chloroethyl)ether	SVOCSW	0.1	mg/kg^	U	<0.1
bis(2-Chloroisopropyl)ether	SVOCSW	0.5	mg/kg^	U	<0.6
bis(2-Ethylhexyl)phthalate	SVOCSW	0.2	mg/kg^	U	<0.2
Butylbenzylphthalate	SVOCSW	0.2	mg/kg^	U	<0.2
Carbazole	SVOCSW	0.3	mg/kg^	N	<0.4
Chrysene	SVOCSW	0.2	mg/kg^	U	2.3
Coronene	SVOCSW	0.3	mg/kg^	N	0.4
Dibenzo[a,h]anthracene	SVOCSW	0.5	mg/kg^	U	<0.6
Dibenzofuran	SVOCSW	0.1	mg/kg^	U	<0.1
Diethylphthalate	SVOCSW	0.1	mg/kg^	U	<0.1
Dimethylphthalate	SVOCSW	0.1	mg/kg^	U	<0.1
Di-n-butylphthalate	SVOCSW	0.1	mg/kg^	U	<0.1
Di-n-octylphthalate	SVOCSW	0.2	mg/kg^	U	<0.2
Diphenyl ether	SVOCSW	0.1	mg/kg^	U	<0.1
Fluoranthene	SVOCSW	0.2	mg/kg^	U	2.7
Fluorene	SVOCSW	0.2	mg/kg^	U	<0.2
Hexachlorobenzene	svocsw	0.1	mg/kg^	U	<0.1
Hexachlorobutadiene	SVOCSW	0.1	mg/kg^	N	<0.1
Hexachlorocyclopentadiene	SVOCSW	0.1	mg/kg^	N	<0.1







Project Name: F2033-22-Crowle

Project No: 22121193

Date Issued: 29/12/2022

Analysis Results					
			Sa	ample ID	001
			Cus	tomer ID	WS09-C-4-ES-0.90- 0.90
			Sam	ple Type	SOLID
			Sampl	ing Date	08/12/2022
Analysis	Method Code	MDL	Units	Accred.	
Hexachloroethane	SVOCSW	0.1	mg/kg^	U	<0.1
Indeno[1,2,3-cd]pyrene	SVOCSW	0.5	mg/kg^	U	1.3
Isophorone	SVOCSW	0.1	mg/kg^	N	<0.1
Naphthalene	SVOCSW	0.1	mg/kg^	U	<0.1
Nitrobenzene	SVOCSW	0.5	mg/kg^	U	<0.6
N-Nitroso-di-n-propylamine	SVOCSW	0.9	mg/kg^	N	<1.1
N-Nitrosodiphenylamine	SVOCSW	0.1	mg/kg^	N	<0.1
Pentachlorophenol	SVOCSW	0.5	mg/kg^	N	<0.6
Phenanthrene	SVOCSW	0.1	mg/kg^	U	0.2
Phenol	SVOCSW	0.1	mg/kg^	U	<0.1
Pyrene	SVOCSW	0.2	mg/kg^	U	2.5
>C10-C12 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U	<4.71
>C12-C16 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U	<4.71
>C16-C21 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	4	mg/kg^	U	<4.71
>C21-C35 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	10	mg/kg^	U	<11.8
Total TPH >C8-C40 (Aliphatic) EH_CU_1D_AL	TPHFIDUS (Aliphatic)	20	mg/kg^	U	<23.5
>C10-C12 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U	<4.71
>C12-C16 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U	8.45
>C16-C21 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	4	mg/kg^	U	9.76







Project Name: F2033-22-Crowle

Project No: 22121193

Date Issued: 29/12/2022

			s	ample ID	001
			Cus	tomer ID	WS09-C-4-ES-0.90- 0.90
			Sam	ple Type	SOLID
			Samp	ling Date	08/12/2022
Analysis	Method Code	MDL	Units	Accred.	
>C21-C35 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	10	mg/kg^	U	27.0
Total TPH >C8-C40 (Aromatic) EH_CU_1D_AR	TPHFIDUS (Aromatic)	20	mg/kg^	U	52.0
Benzene	VOCHSAS	1	μg/kg^	UM	<1
Ethylbenzene	VOCHSAS	2	μg/kg^	UM	<2
m and p-Xylene	VOCHSAS	4	μg/kg^	UM	<4
MTBE	VOCHSAS	1	μg/kg^	UM	<1
o-Xylene	VOCHSAS	2	μg/kg^	UM	<2
Toluene	VOCHSAS	5	μg/kg^	UM	<5
1,1,1,2-Tetrachloroethane	VOCHSAS	1	μg/kg^	UM	<1
1,1,1-Trichloroethane	VOCHSAS	1	μg/kg^	UM	<1
1,1,2,2-Tetrachloroethane	VOCHSAS	1	μg/kg^	N	<1
1,1,2-Trichloroethane	VOCHSAS	1	μg/kg^	UM	<1
1,1-Dichloroethane	VOCHSAS	1	μg/kg^	UM	<1
1,1-Dichloroethene	VOCHSAS	1	μg/kg^	U	<1* _B
1,1-Dichloropropene	VOCHSAS	1	μg/kg^	UM	<1
1,2,3-Trichlorobenzene	VOCHSAS	3	μg/kg^	UM	<3
1,2,3-Trichloropropane	VOCHSAS	1	μg/kg^	UM	<1
1,2,4-Trichlorobenzene	VOCHSAS	3	μg/kg^	N	<3
1,2,4-Trimethylbenzene	VOCHSAS	1	μg/kg^	UM	<1







Project Name: F2033-22-Crowle

Project No: 22121193

Date Issued: 29/12/2022

			S	ample ID	001
			Cus	stomer ID	WS09-C-4-ES-0.90- 0.90
			San	nple Type	SOLID
			Samp	ling Date	08/12/2022
Analysis	Method Code	MDL	Units	Accred.	
1,2-Dibromo-3-chloropropane	VOCHSAS	1	μg/kg^	U	<1
1,2-Dibromoethane	VOCHSAS	1	μg/kg^	UM	<1
1,2-Dichlorobenzene	VOCHSAS	1	µg/kg^	UM	<1
1,2-Dichloroethane	VOCHSAS	1	μg/kg^	UM	<1
1,2-Dichloropropane	VOCHSAS	1	μg/kg^	UM	<1
1,3,5-Trimethylbenzene	VOCHSAS	1	µg/kg^	UM	<1
1,3-Dichlorobenzene	VOCHSAS	1	μg/kg^	UM	<1
1,3-Dichloropropane	VOCHSAS	1	μg/kg^	UM	<1
1,4-Dichlorobenzene	VOCHSAS	1	μg/kg^	UM	<1
2,2-Dichloropropane	VOCHSAS	2	μg/kg^	UM	<2
2-Chlorotoluene	VOCHSAS	1	μg/kg^	UM	<1
4-Chlorotoluene	VOCHSAS	1	μg/kg^	UM	<1
Benzene	VOCHSAS	1	μg/kg^	UM	<1
Bromobenzene	VOCHSAS	1	μg/kg^	UM	<1
Bromochloromethane	VOCHSAS	1	μg/kg^	UM	<1
Bromodichloromethane	VOCHSAS	1	μg/kg^	UM	<1
Bromoform	VOCHSAS	1	μg/kg^	UM	<1
Bromomethane	VOCHSAS	1	μg/kg^	UM	<1* _B
Carbon Tetrachloride	VOCHSAS	1	μg/kg^	UM	<1







Project Name: F2033-22-Crowle

Project No: 22121193

Date Issued: 29/12/2022

			S	ample ID	001
			Cus	stomer ID	WS09-C-4-ES-0.90- 0.90
			San	nple Type	SOLID
			Samp	ling Date	08/12/2022
Analysis	Method Code	MDL	Units	Accred.	
Chlorobenzene	VOCHSAS	1	μg/kg^	UM	<1
Chloroethane	VOCHSAS	2	μg/kg^	UM	<2* _B
Chloroform	VOCHSAS	1	μg/kg^	UM	<1
Chloromethane	VOCHSAS	3	μg/kg^	U	<3* _B
cis 1,2-Dichloroethene	VOCHSAS	5	µg/kg^	UM	<5
cis 1,3-Dichloropropene	VOCHSAS	1	μg/kg^	UM	<1
Dibromochloromethane	VOCHSAS	1	μg/kg^	UM	<1
Dibromomethane	VOCHSAS	1	μg/kg^	UM	<1
Dichlorodifluoromethane	VOCHSAS	1	µg/kg^	N	<1
Ethylbenzene	VOCHSAS	2	µg/kg^	UM	<2
Hexachlorobutadiene	VOCHSAS	2	μg/kg^	N	<2
iso-Propylbenzene	VOCHSAS	1	μg/kg^	UM	<1
m and p-Xylene	VOCHSAS	4	μg/kg^	UM	<4
MTBE	VOCHSAS	1	μg/kg^	UM	<1
Naphthalene	VOCHSAS	5	μg/kg^	UM	9
n-Butylbenzene	VOCHSAS	1	μg/kg^	U	<1
o-Xylene	VOCHSAS	2	μg/kg^	UM	<2
p-Isopropyltoluene	VOCHSAS	1	μg/kg^	UM	<1
Propylbenzene	VOCHSAS	1	µg/kg^	UM	<1







Project Name: F2033-22-Crowle

Project No: 22121193

Date Issued: 29/12/2022

			S	ample ID	001
			Cus	stomer ID	WS09-C-4-ES-0.90- 0.90
			San	ple Type	SOLID
			Samp	ling Date	08/12/2022
Analysis	Method Code	MDL	Units	Accred.	
sec-Butylbenzene	VOCHSAS	1	μg/kg^	UM	<1
Styrene	VOCHSAS	1	μg/kg^	UM	<1
tert-Butylbenzene	VOCHSAS	1	μg/kg^	UM	<1
Tetrachloroethene	VOCHSAS	3	μg/kg^	UM	<3
Toluene	VOCHSAS	5	μg/kg^	UM	<5
trans 1,2-Dichloroethene	VOCHSAS	1	μg/kg^	UM	<1
trans 1,3-Dichloropropene	VOCHSAS	1	μg/kg^	UM	<1
Trichloroethene	VOCHSAS	1	μg/kg^	U	<1
Trichlorofluoromethane	VOCHSAS	1	μg/kg^	UM	<1* B
Vinyl Chloride	VOCHSAS	1	μg/kg^	UM	<1* B
Total Moisture at 35°C	CLANDPREP	0.1	%	N	15.0
Description of Solid Material	CLANDPREP		-	N	SAND
Redox Potential	SUB016		mV	N	346.66
Asbestos Identification	SUB020		-	N	NAIIS







CERTIFICATE OF ANALYSIS

ANALYSIS REQUESTED BY: SOCOTEC UK Ltd

Environmental Chemistry

PO Box 100 Burton upon Trent Staffordshire DE15 0XD **CONTRACT NO:** S29852-11

DATE OF ISSUE: 22.12.22

DATE SAMPLE RECEIVED: 16.12.22

DATE ANALYSIS COMPLETED: 21.12.22

DESCRIPTION: One soil/loose aggregate sample weighing approximately 1.0kg.

ANALYSIS REQUESTED: Qualitative and quantitative analysis of a soil/loose aggregate sample for

mass determination of asbestos.

METHODS:

Qualitative - The sample was analysed qualitatively for asbestos by polarised light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative - The analysis was carried out using our documented in-house method based on HSE Contract Research Report No. 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies *et al*, 1996) and HSG 248. Our method includes initial examination of the entire sample, detailed analysis of a representative sub-sample and quantification by hand picking/weighing and/or fibre counting/sizing as appropriate.

RESULTS:

Initial Screening

No asbestos was detected in the soil sample by stereo-binocular and polarised light microscopy.

A summary of the results is given in Table 1.







CONTRACT NO: \$29852-11 **DATE OF ISSUE:** 22.12.22

RESULTS: (cont.)

Table 1: Qualitative Results

SOCOTEC Job I.D: 22121193

IOM sample number	SOCOTEC Sample ID	Client Sample ID	ACM type detected	PLM result
S29852-40	22121193-001	WS09-C-4-ES-0.90-0.90	-	No Asbestos Detected

Our detection limit for this method is 0.001%.

COMMENTS:

IOM Consulting cannot accept responsibility for samples that have been incorrectly collected or despatched by external clients.

Any opinions and interpretations expressed herein are out with the scope of our UKAS accreditation.





Element Materials Technology

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Zone 3

Deeside Industrial Park

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W: www.element.com

Socotec ESG ESG House, Bretby Business Park

Bretby Burton upon Trent

Attention:

Date: 20th December, 2022

Your reference: 22121193

Our reference : Test Report 22/20591 Batch 1

Location : Crowle

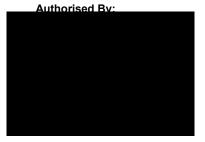
Date samples received: 14th December, 2022

Status: Final Report

Issue: 1

One sample was received for analysis on 14th December, 2022 and was scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.



Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Socotec

Reference: 22121193 Location: Crowle

Contact: EMT Job No:

22/20591

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EWI JOD NO:	22/20591							
EMT Sample No.	1							
Sample ID	22121193-001							
Depth						Please se	e attached n	ntes for all
COC No / misc						abbrevi	ations and ac	cronyms
Containers	V							
Sample Date	08/12/2022							
Sample Type	Soil							
Batch Number						LOD/LOR	Units	Method No.
Date of Receipt								
Redox Potential	346.66						mV	TM139/PM0

Client Name: Socotec
Reference: 22121193
Location: Crowle

Contact:

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
					No deviating sample report results for job 22/20591	

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 22/20591

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCI (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

EMT Job No.: 22/20591

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

ABBREVIATIONS and ACRONYMS USED

SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
В	Indicates analyte found in associated method blank.
DR	Dilution required.
М	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
СО	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
ТВ	Trip Blank Sample
OC	Outside Calibration Range

Element Materials Technology

Method Code Appendix

EMT Job No: 22/20591

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM139	ASTM G200-09 (2014) Oxidation-Reduction potential of soil samples removed from the ground, using Redox probe and meter.	PM0	No preparation is required.			AR	No



Project Name: F2033-22-Crowle

Project No: 22121193 Date Issued: 29/12/2022

Method Description

Deviating Sample Report

Sample Reference	<u>Text ID</u>	<u>Method Code</u>	Incorrect Container	Incorrect Label	Headspace	Incorrect/No Preservative	No Sampling Date	Holding Time
WS09-C-4-ES-0.90-0.90	22121193-001	GROHSA/BTEXHSA						✓

Analysis Method

Method Code

BTEXHSA	BTEX by GCFID	As Received
CLANDPREP	Basic Solid Description	As Received
CLANDPREP	DW35 - CLand Prep and Dry Weight Correction to 35°C	As Received
GROHSA/BTEXHSA	GRO CWG (C5-C10) Ali/Aro Split	As Received
ICPACIDS	Sulphate as SO4 (Acid Soluble)	Air Dried & Ground
ICPBOR	Boron (Water Soluble) by ICPOES	Air Dried & Ground
ICPMSS	Arsenic in Solids by ICPMS	Air Dried & Ground
ICPMSS	Cadmium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Chromium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Copper in Solids by ICPMS	Air Dried & Ground
ICPMSS	Lead in Solids by ICPMS	Air Dried & Ground
ICPMSS	Mercury in Solids by ICPMS	Air Dried & Ground
ICPMSS	Nickel in Solids by ICPMS	Air Dried & Ground
ICPMSS	Selenium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Vanadium in Solids by ICPMS	Air Dried & Ground
ICPMSS	Zinc in Solids by ICPMS	Air Dried & Ground
ICPWSS	Sulphate as SO4 (Water Soluble)	Air Dried & Ground
KONECL	Chloride (2:1) by Colorimetry	Air Dried & Ground
KONENS	Chromium VI (Hexavalent) by Colorimetry	Air Dried & Ground
PAHMSUS	17 PAHs (inc. Coronene) by GCMS	As Received
PHSOIL	pH (2.5:1)	As Received
SFAPI	Cyanide (Complex) by SFA	As Received
SFAPI	Cyanide (Free) by SFA	As Received
SFAPI	Cyanide (Total) by SFA	As Received
SFAPI	Phenol Index (Total) by SFA	As Received
SFAPI	Sulphide by SFA	As Received
SUB016	Redox Potential in Soil	
SUB020	Asbestos Stage 1 (with Stage 2+3 Trigger)	
SVOCSW	SVOCs (Target List) by GCMS	As Received
TPHFIDUS (Aliphatic)	TPH (CWG) Aliphatic Split with Carbon Banding	As Received
TPHFIDUS (Aromatic)	TPH (CWG) Aromatic Split with Carbon Banding	As Received
TSCONW	Electrical Conductivity (5:1)	Air Dried & Ground
VOCHSAS	BTEX & MTBE by GCMS	As Received
VOCHSAS	VOCs (Target List) by GCMS	As Received
WSLM59	SOM: Soil Organic Matter (%) (Calc)	Air Dried & Ground

Analysis Method



Project Name: F2033-22-Crowle

Project No: 22121193 Date Issued: 29/12/2022

Result Report Notes

Letters alongside results signify that the result has associated report notes. The report notes are as follows:

Letter	Note
--------	------

- A Due to the matrix of the sample the laboratory has had to deviate from our standard protocols to be able to process the sample and provide a result. Where applicable the accreditation has been removed and this should be taken into consideration when utilising the data.
- B The QC associated with this result has not wholly met the QMS requirements, the accreditation has therefore been removed. However, the Laboratory has confidence in the performance of the method as a whole and that the integrity of the data has not been significantly compromised.
- Due to matrix interference, the internal standard and/or surrogate has not met the QMS requirements. This should be taken into consideration when utilising the data.
- D A non-standard volume or mass has been used for this test which has resulted in a raised detection limit.
- E Due to the parameter value being beyond our calibration range (and following the maximum size of dilution allowed, where applicable), the result cannot be quantified and as such the result will appear as a greater than symbol (>) with the accreditation removed. This data should be used for indicative purposes only.
- F Based on the sample history, appearance and smell a dilution was applied prior to testing. Unfortunately, the result is either above (>) or below (<) our calibration range. Results above our calibration range have accreditation removed. The data should be used for indicative purposes only.
- G The day 5 oxygen reading was below the capability of the instrument to detect, and therefore the calculated BOD has been reported unaccredited for guidance purposes only.

HWOL Acronym Key

<u>Acronym</u> <u>Description</u>

HS Headspace Analysis

EH Extractable Hydrocarbons - i.e everything extracted by the solvent(s)

CU Clean up - e.g. by florisil, silica gel
1D GC - Single coil gas chromatography

Total Aliphatics & Aromatics

AL Aliphatics only AR Aromatics only

+ Operator to indicate cumulative e.g. EH_CU+HS_1D_Total



Project Name: F2033-22-Crowle

Project No: 22121193 Date Issued: 29/12/2022

Additional Information

This report refers to samples as received. SOCOTEC UK Ltd takes no responsibility for accuracy or competence of sampling by others.

Results within this report relate only to the samples tested.

The accreditation codes are as follows:

U = UKAS accredited analysis M = MCERT accredited analysis N = Unaccredited analysis

Any units marked with ^ signify results are reported on a dry weight basis of 35 ° C.

All Air Dried and Ground Samples (ADG) are oven dried at less than 35° c.

This report shall not be reproduced except in full, without written approval of the laboratory.

Opinions and interpretations given are outside the scope of our UKAS accreditation.

Any samples marked with * are not covered by our scope of UKAS accreditation. If applicable, further report notes have been added.

Any solid samples where the Major Constituents are not one of the following (Sand, Silt, Clay, Made Ground) are not one of our accredited matrix types.

Any samples marked with ‡ have had MCERTS accreditation removed for this result

Any samples marked with a tick in the deviant table is deviant for the specific reason.

Any samples reported as IS, NA, ND mean the following:

IS = Insufficient Sample to complete analysis

NA = Sample is not amenable for the required analysis

ND = Results cannot be determined

Items listed with a 'SUB' method code prefix have been carried out by an external subcontracted laboratory.

Our deviating sample report does not include deviancy information for Subcontracted analysis. Please see the report from the subcontracted lab for information regarding any deviancies for this analysis.

Summaries of analysis methods are available upon request.

End of Certificate of Analysis



APPENDIX F PHOTOGRAPHS

Rotary Cores

Dynamic (windowless) Sample Liners

Sheets F1 to F9 Sheets F10 to F25





BH01-W 9.91 m to 12.00 m



BH01-W 12.00 m to 13.70 m

CROWLE FLOOD ALLEVIATION GI Project Notes:

> Severn Trent Water Carried out for

Project No. F2033-22 Sheet





BH01-W 13.70 m to 14.50 m



BH01-W 14.50 m to 16.20 m

CROWLE FLOOD ALLEVIATION GI Project

> Project No. Carried out for

F2033-22 Severn Trent Water Sheet





BH01-W 16.20 m to 18.00 m



BH01-W 18.00 m to 19.50 m

Project CROWLE FLOOD ALLEVIATION GI

Project No. F2033-22
Carried out for Severn Trent Water

LE FLOOD ALLEVIATION GI Sheet





BH01-W 19.50 m to 21.00 m



BH01-W 21.00 m to 22.50 m

Project CROWLE FLOOD ALLEVIATION GI

Project No. F2033-22 Carried out for Severn Trent Water Sheet





BH01-W 22.50 m to 24.00 m



BH02-E Core 4.50 m to 7.10 m

Project

Project No. F2033-22 Severn Trent Water Carried out for

CROWLE FLOOD ALLEVIATION GI

F5





BH02-E Core 7.10 m to 8.60 m



BH02-E Core 8.60 m to 10.10 m

CROWLE FLOOD ALLEVIATION GI Project

Project No. F2033-22 Severn Trent Water Carried out for

Notes:





BH02-E Core 10.10 m to 11.60 m



BH02-E Core 11.60 m to 13.10 m

Project CROWLE FLOOD ALLEVIATION GI

Notes:

Carried out for Severn Trent Water

Project No. F2033-22

F7





BH02-E Core 13.10 m to 14.60 m



BH02-E Core 14.60 m to 16.10 m

Project CROWLE FLOOD ALLEVIATION GI

Project No. F2033-22 Carried out for Severn Trent Water Sheet





BH02-E Core 16.10 m to 17.60 m



BH02-E Core 17.60 m to 20.00 m

Notes:

Project CROWLE FLOOD ALLEVIATION GI

Project No. Carried out for F2033-22 Severn Trent Water Sheet



F10



WS01-W 1.20 m to 2.00 m



WS01-W 2.00 m to 3.00 m





WS01-W 3.00 m to 4.00 m



WS01-W 4.00 m to 5.00 m





WS01-W 5.00 m to 6.00 m



WS02-W 1.20 m to 2.00 m

Notes: Project CROWLE FLOOD ALLEVIATION GI Sheet

Project No. F2033-22 Carried out for Severn Trent Water





WS02-W 2.00 m to 3.00 m



WS02-W 3.00 m to 4.00 m





WS02-W 4.00 m to 5.00 m



WS02-W Spoil 0.00 m to 1.20 m

CROWLE FLOOD ALLEVIATION GI Project Notes:

> Project No. F2033-22 Carried out for Severn Trent Water





WS03-E 1.20 m to 2.00 m



WS04-E 1.20 m to 3.00 m

Notes:	Project	CROWLE FLOOD ALLEVIATION GI	Sheet	
	Project No. Carried out for	F2033-22 Severn Trent Water		F15





WS04-E 3.00 m to 5.00 m

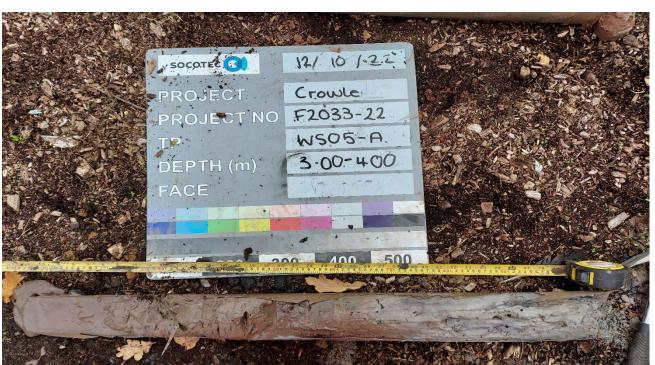


WS05-A 1.20 m to 2.00 m





WS05-A 2.00 m to 3.00 m

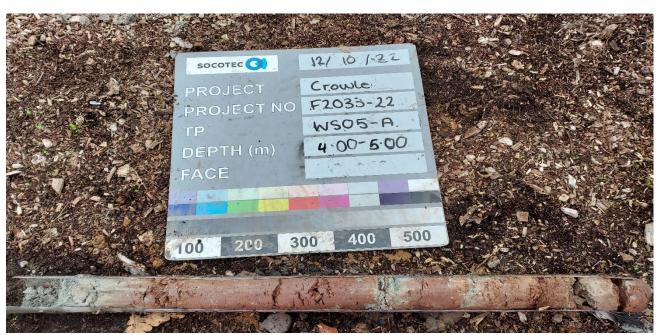


WS05-A 3.00 m to 4.00 m

Notes: Project CROWLE FLOOD ALLEVIATION GI

Project No. F2033-22 Carried out for Severn Trent Water





WS05-A 4.00 m to 5.00 m



WS06-A 1.20 m to 2.00 m





WS06-A 2.00 m to 3.00 m



WS06-A 3.00 m to 4.00 m



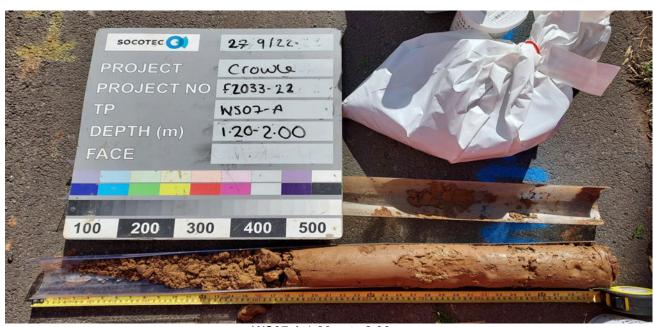


WS06-A 4.00 m to 5.00 m



WS06-A Spoil 0.00m - 1.20m





WS07-A 1.20 m to 2.00 m



WS07-A 2.00 m to 3.00 m





WS07-A 3.00 m to 4.00 m



WS08-A 1.20 m to 2.00 m





WS08-A 2.00 m to 3.00 m



WS08-A 3.00 m to 3.75 m





WS08-A Spoil 0.00 m to 1.20 m



WS09-C 1.20 m to 3.00 m

Notes:	Project	CROWLE FLOOD ALLEVIATION GI	Sheet
	Project No. Carried out for	F2033-22 Severn Trent Water	F24





WS09-C 3.00 m to 4.00 m

